Claims:

1. A trampoline enclosure system comprising:

a trampoline having a rebounding surface and a plurality of vertically-extending legs which support the rebounding surface at an elevation above ground level;

a plurality of posts, each post (a) being secured to one of the legs, and (b) having an upper end portion, a wall support portion located above the level of the surface, a lower portion located below the level of the surface;

a plurality of leg fasteners which secure the posts to the legs;

a flexible top line which extends between the upper end portions of adjacent posts; and

a generally cylindrical wall made of a flexible material which is secured to the wall support portions of the posts and to the top line so that the wall defines a chamber above the rebounding surface.

2. The system of claim 1 wherein the wall comprises a continuous expanse of the flexible material, except that the wall defines an opening for permitting a user of the trampoline to enter and leave the chamber.

3. The system of claim 1 wherein the top line is a strap of nylon webbing, thereby providing relatively inelastic coupling of said upper end portions.

4. The system of claim 1 further comprising a clamp which presses the top line against one of the posts to secure the line to the post.

5. The system of claim 1 further comprising a buckle which defines an opening through which a loop of the top line extends, which loop and buckle together are positioned to chokingly surround the post when the line is taught.

6. The system of claim 1 further comprising an bracket secured on one of the posts, the bracket defining at least one opening to receive the top line.

7. The system of claim 1 wherein:

a circumferential neck channel extends at least partially around at least one of the posts; and

the top line nests in the channel.

8. The system of claim 1 further comprising a flexible bottom line which is attached to the wall and which extends between adjacent posts at a level below the top line.

9. The system of claim 8 wherein the bottom line is a strap of webbing.

10. The system of claim 1 wherein the flexible material is a mesh.

11. The system of claim 1 wherein the flexible material is plastic safety fencing.

12. The system of claim 11 wherein the top line is interlaced through openings in the fencing.

13. The system of claim 11 further comprising a flexible bottom line which (a) extends between adjacent posts at a level below the top line and (b) is interlaced through openings in the fencing.

14. The system of claim 11 further comprising a post securement line which (a) wraps helically around the wall support portion of one of the posts and (b) is interlaced through openings in the fencing to secure the fencing to the post at multiple elevations.

15. The system of claim 1 wherein the wall support portions are sheathed by a layer of padding material.

16. The system of claim 1 further comprising shock absorption elements which allow the wall support portions to move a limited distance outwardly from the center of the chamber when force is applied from within the chamber.

17. The system of claim 16 wherein each leg fastener comprises (a) a block having two vertically-extending channels which are shaped respectively to partially receive a leg and to partially receive a post, (b) a first retainer shaped to wedgingly secure the leg in one of the channels, 8 a second retainer shaped to wedgingly secure the post in the other channel, and (d) at least one spring mounted to serve as a shock absorption element so that the post can move a short distance relative to the leg when a sufficient force is applied to overcome the urging of the spring.

18. The system of claim 1 further comprising a frame which surrounds the surface and is supported by the legs, the surface being provided by a sheet of fabric which is stretched on the frame.

19. The system of claim 18 wherein the posts are secured to the frame or legs by cable ties and resilient members are provided between the cable ties and the posts such that a post can move a short distance relative to the leg when a sufficient force is applied on the wall support portion of the post to compress the resilient member.

20. The system of claim 18 wherein each post is secured to both the frame and one of the legs.

21. The system of claim 1 wherein:

the surface is provided by a sheet of fabric which is supported by a frame which surrounds the surface and is supported by the legs; and

the posts are secured to the frame by cable ties.

22. The system of claim 1 wherein the posts are secured to the legs by cable ties.

23. The system of claim 1 wherein:

the leg fasteners are pipe clamps, each pipe clamp being a hinge having two wings with each wing having a free end portion, the wings together defining a passageway between the wings, which passageway receives both a leg and a post and is located such that the free ends of the wings are located opposite one another when the leg and the post are clamped between the wings; and

each pipe clamp further comprises at least one bolt which secures the ends of the wings together and thereby wedgingly holds a leg and a post together in the clamp.

24. The system of claim 1 wherein:

the leg fasteners are pipe clamps, each pipe clamp comprising a girdle which defines two passageways which receive one of the legs and one of the posts respectively; and

each pipe clamp further comprises at least one tightener operable to reduce the cross-sectional areas of the passageways and thereby chokingly hold the leg and the post together in the clamp.

25. The system of claim 1 further comprising a plurality of cross braces, each cross brace having an upper end and a lower end located at an elevation below the

upper end, the upper and lower end of each cross-brace being connected respectively to the wall support portion of two adjacent posts.

26. The system of claim 25 wherein:

the cross braces are flexible lines;

the upper ends of the cross braces are attached to the upper ends of the posts; and

the lower ends of the cross braces are attached at the bottoms of the wall support portions of the posts.

27. The system of claim 1 further comprising an end cap at the top of the upper end portion of each post.

28. The system of claim 27 wherein each end cap has a shock absorbing element positioned so that the cap descends for a short distance when downward pressure is applied to the end cap.

29. The system of claim 1 further comprising an awning which extends over the chamber and which is supported by at least some of the posts.

30. The system of claim 1 further comprising a basketball backboard supported by at least one of the posts.

31. The system of claim 1 further comprising a divider wall which extends between two of the wall support portions and divides the chamber to form two compartments.

32. The system of claim 1 further comprising:

a generally vertically-extending interior post; and

an interior post support structure which holds the interior post at a position inside the chamber.

33. A trampoline enclosure system comprising:

a trampoline having a generally horizontal rebounding surface provided by a sheet of stretched fabric;

a frame on which the fabric is stretched;

a plurality of posts, each post (a) being pivotally mounted to the frame, and (b) having an upper end portion, a wall support portion located above the level of the

surface, a lower portion located below the level of the surface, and a lower end portion;

a flexible top line which extends between the upper end portions of adjacent posts; and

a generally cylindrical wall made of a flexible material which is secured to the wall support portions of the posts and to the top line so that the wall defines a chamber above the rebounding surface.

34. The system of claim 33 further comprising:

multiple anchor points located at fixed positions relative to the frame, one of the anchor points being located adjacent to the lower end portion of each post; and

a resilient member connected between the lower end portion of each post and an adjacent anchor point such that the resilient member urges the lower end portion to a fixed position and is deformable to allow the wall support portion of the post to move a limited distance outwardly from the center of the chamber when force is applied to the post from within the chamber.

35. The system of claim 33 further comprising resilient members which connect the top line to the posts.

36. The system of claim 33 wherein the top line is a rigid hoop.

37. The system of claim 36 wherein the hoop is circular.

38. The system of claim 33 wherein the posts are fastened to the frame by cable ties.

39. The system of claim 33 wherein:

the system further comprises multiple anchor points located below the frame at fixed positions relative to the frame;

the lower end portion of each post is connected to an anchor point;

the posts are secured to the frame by cable ties; and

resilient members are provided between the cable ties and the posts such that a post can move a short distance relative to the frame when a sufficient force is applied on the wall support portion of the post to compress the resilient member.

40. The system of claim 33 wherein:

the system further comprises multiple anchor points located below the frame at fixed positions relative to the frame;

the lower end portion of each post is connected to one of the anchor points;

at least one post is fastened to the frame by an elastic member which has an elongated body and which defines first and second openings defined at opposite ends of the body, the first opening containing the post at a location above the frame, the second opening containing the post at a location below the frame and the body extending at least partially around the frame so that the elastic member holds the post and the frame together and so that the post can move a short distance relative to the frame when a sufficient force is applied on the wall support portion of the post to compress the stretch the elastic member.

41. The system of claim 33 further comprising an end cap at the top of the upper end portion of each post.

42. The system of claim 41 wherein each end cap has a shock absorbing element positioned so that the cap descends for a short distance when downward pressure is applied to the end cap.

43. A trampoline enclosure system comprising:

a trampoline having a generally horizontal rebounding surface provided by a sheet of stretched fabric;

a frame on which the fabric is stretched;

a plurality of posts which support the rebounding surface at an elevation above ground level, each post (a) being mounted to the frame, and (b) having an upper end portion, a wall support portion located above the level of the surface, a lower portion located below the level of the surface, and a lower end portion which rests on the ground;

a flexible top line which extends between the upper end portions of adjacent posts; and

a generally cylindrical wall made of a flexible material which is secured to the wall support portions of the posts and to the top line so that the wall defines a chamber above the rebounding surface.

44. The system of claim 43 further comprising an end cap at the top of the upper end portion of each post.

45. The system of claim 44 wherein each end cap has a shock absorbing element positioned so that the cap descends for a short distance when downward pressure is applied to the end cap.

46. A trampoline system comprising:

a trampoline having a rebounding surface;

a plurality of posts spaced around the rebounding surface, each post (a) extending generally vertically, and (b) having an upper end portion and a wall support portion located above the level of the surface;

a generally cylindrical wall made of a flexible material; and

a plurality of sleeves attached to the wall, the sleeves being sized and positioned such that when wall support portions of the posts are received in the sleeves, the wall defines a chamber above the rebounding surface.

47. A trampoline system comprising:

a trampoline, including a substantially horizontal frame having a rebounding surface coupled thereto, and plural legs positioning the frame above the ground;

a fence support structure including plural support members;

wherein at least one of said support members is coupled by a first removable fastener to a leg, and by a second removable fastener to the frame.

48. The system of claim 47 wherein each of said first and second removable fasteners includes at least one U-bolt.

49. A trampoline system comprising:

a trampoline having a rebounding surface;

a fence support structure including plural support members;

an elongated resilient member coupling plural of said support members at upper portions thereof; and

a tensioning device for changing the length of the resilient member, and thus the tension provided thereby.

50. A trampoline system comprising:

a trampoline having a rebounding surface;

a fence support structure including plural support members;

an elongated resilient member coupling plural of said support members;

wherein the elongated resilient member is relatively flat, providing an increased surface area to reduce cutting injuries, and tending to automatically rotate to present a flat face towards any impacting body.

51. A trampoline system comprising:

a trampoline having a rebounding surface;

a fence support structure including plural support members;

fence netting having plural openings, the netting being coupled to one of said support members by a continuous length of elastic cord that passes through plural of said openings.

52. The system of claim 51 in which the elastic cord has first and second ends fixedly disposed relative to said support member, and the cord threads in and out openings of the fence netting near the associated upright, the system further including a flexible strap member helically wrapping around said support member and coupling the cord thereto at plural intermediate points therealong.

53. A trampoline system comprising:

a trampoline having a rebounding surface;

a fence support structure including plural support members;

fence netting coupled to the support structure and defining a chamber above the rebounding surface, the netting further defining a door flap permitting access to said chamber; and

a lock for securing the door flap in a closed position, thereby impeding unauthorized access to said chamber.

54. A trampoline system comprising:

a trampoline having a rebounding surface;

a fence including plural support members with fence netting coupled thereto, said support members having resilient sheaths therearound, the netting being coupled to each support member through said resilient sheath at plural points therealong;

wherein an impact by a jumper against the fence nearest to a first support member is absorbed, in part, by resilient sheaths on plural support members remote from the first.

55. The system of claim 54 in which the netting is coupled to each sheath through an elongated strap member helically wrapped therearound, the strap distributing force over a larger area of the resilient sheath than a cord, thereby cutting less into the resilient sheath, and providing area of the sheath to absorb said impact.

56. A trampoline system comprising:

a circular trampoline having a rebounding surface;

a safety fence including a support structure with fence netting coupled thereto, the support structure including plural vertical members, the fence netting defining a volume therein;

the support structure further including a pair of flexible diagonal bracing members extending downwardly from near the top of at least one of said vertical members;

there being an imaginary plane passing symmetrically between said diagonal bracing members and including said vertical member and the center of said rebounding surface;

said diagonal bracing members:

(a) permitting limited flexure of the top of said member towards said volume in at least certain directions not in said plane;

(b) permitting more flexure of the top of said member towards said volume within said plane; and

(c) permitting substantially no flexure of the top of said member away from said volume.

57. A trampoline system comprising:

a horizontal rebounding surface; and

a substantially vertical rebounding surface defining a chamber above the horizontal rebounding surface, the vertical rebounding surface having a horizontal rebound factor of at least 10%.

58. The system of claim 57 in which the vertical rebounding surface has a rebound factor of at least 20%.

59. The system of claim 57 in which the vertical rebounding surface has a rebound factor of at least 30%.

60. The system of claim 57 in which the vertical rebounding surface has a rebound factor of at least 40%.

61. A trampoline system comprising:

a rebounding surface;

a fence defining a chamber above the rebounding surface, the fence including plural upright poles and netting coupled thereto, each of the poles being sheathed in a resilient material; and

an end cap on the top of each pole and including a sleeve downwardly extending over at least a top portion of the sheath, thereby preventing water from traveling between the outside of the pole and the inside of the sheath with attendant premature weathering of the sheath.

62. A trampoline system comprising:

a rebounding surface coupled to a surrounding frame by plural spring members; and

a fence including plural vertical supports, each of the supports having shock absorbing padding therearound, the fence defining a chamber above the rebounding surface;

wherein the fence prevents users from accidentally impacting any of the spring members.

63. A trampoline system comprising:

a trampoline having a rebounding surface; and

a fence including plural support members and a wall material coupled thereto, the wall material defining an enclosed chamber;

wherein tops of at least certain of said support members are independently movable, rather than being rigidly coupled to other support members, so that an impact midway up the wall material at any position therearound causes tops of remote support members to deflect towards said impact.

64. A trampoline system comprising:

a rebounding surface; and

means for forming a safety fence therearound.

ENCLOSURE SYSTEM FOR TRAMPOLINE

Background of the Invention

The present invention concerns wall structures used with trampolines to protect trampoline users and to provide new uses for trampolines.

In the past, trampolines have been used for a variety of athletic and recreational purposes. However, injuries have sometimes resulted when a person jumping on a trampoline would land too near the boundary of the rebounding surface and strike the trampoline frame or fall off an elevated trampoline.

To reduce such injuries, devices have been made to form a wall around the perimeter of a trampoline bed so that when a jumper lands too near the edge, the wall prevents the jumper from falling off. For the most part, these devices have been passive walls which do not assist a jumper, except for providing basic protection, and which do not add anything to the experience of using a trampoline. Thus, there is a need for a trampoline enclosure system that does more than provide basic, wall-like protection.

Summary of the Invention

The present invention is a wall enclosure system which not only provides protection for a trampoline jumper, but also actively responds to an impact by urging the jumper back toward the center of the rebounding surface of the trampoline.

The present system has several unique structural features which make the wall active in response to an impact. These features also make the system easy to install and universally applicable to almost all types of trampolines. The construction of the present system also makes it possible to mount a variety of game accessories so that a jumper can use the trampoline for purposes not possible in the past. A variety of new games are made possible by these constructions.

These and other unique features of the invention will be understood with referenced to the following detailed description and drawings.

APPENDIX A

In the Drawings

Fig. 1 is an oblique view showing a trampoline apparatus including an enclosure system according to the present invention.

Fig. 2 is top plan view of the apparatus shown in Fig. 1.

Fig. 3 is an enlarged oblique view of a leg portion of the apparatus shown in Fig. 1.

Figs. 4, 4a are enlarged partial oblique views of a wall portion of the apparatus shown in Fig. 1.

Fig. 5 is an enlarged partial side view of the apparatus shown in Fig. 1.

Figs. 6, 6a are an enlarged views of an end cap shown in Fig. 5.

Fig. 6b illustrates a door structure.

Fig. 7, 7a are views of another trampoline apparatus including an enclosure system according to the present invention.

Fig. 8 is an oblique schematic view of the apparatus shown in Fig. 7.

Figs. 9-14 are views of various alternative constructions and accessories.

Detailed Description

Trampolines come in a variety of configurations and sizes. A popular trampoline is shown in Figs. 1-2. The illustrated trampoline has a circular frame 34 supported by multiple U-shaped tubular legs 36. The U-shaped legs have two vertically-extending sections 37 connected by a horizontal section which rests on the ground. The upper ends of the vertical leg sections 37 are secured to the frame 34 by welds. For ease in storage, it is convenient for the legs to be removable. This is made possible by providing a swage joint 38 in each vertical leg section 37. A plurality of spring members 39 tautly attach a sheet of sturdy fabric 40 to the frame 34 so that the fabric provides a rebounding surface or bed. Other types of trampolines, having variations in structure such as individual legs secured by bolts or the like, will equally benefit from the present invention.

The trampoline is augmented by an enclosure system 30 which provides a protective and interactive environment for the trampoline user. The system 30 includes a plurality of posts 44 which extend vertically. Each post 44 is secured to a vertical section 37 of one of the legs 36. For the purpose of this disclosure, each

post 44 is referred to as having an upper end portion 46, a wall support portion 48 located above the level of the rebounding surface 40, a lower portion 50 located below the surface 40, and a lower end portion 52 which extends to ground level. These designations refer to locations on a post 44, not to separable sections. In the illustrated embodiment, each post 44 is made in two sections and connected at a swage joint 54, with the two pieces secured together by a set screw. A single-piece post could also be used, or a post comprised of more than two pieces secured end-to-end with swage fittings and set screws. A multi-piece post is easier to package and ship than a unitary post.

Each post is connected to a leg by two leg fasteners 58, 60. As best seen in Fig. 3, the upper fastener 58 is an assembly having two U-bolts 64. The U-bolts have threaded ends 65. In use, the U-bolts are positioned to encompass the frame 34 on opposite sides of the vertically extending portion 37 of a leg 36. Two saddle clamps 66 are respectively positioned above and below the frame 34. Each clamp 66 has two openings which respectively receive one threaded end 65 of each of the two U-bolts. Nuts 68 are tightened onto the threaded ends 65 of the U-bolts 64 in order to secure the post 44 to the frame 34. To provide a degree of flexibility in the fasteners 58, stiff compression springs (not shown) could be provided between the saddle clamps 66 and nuts 68. In this arrangement, locking nuts would be used, and the nuts would not be tightened to that extent that the springs were completely crushed. With such springs in place, a post 44 could be moved a short distance away from the frame 34 when a person bounced against the post from inside the chamber 106. The additional movement of the pole would help cushion the impact on the person.

A rigid, smooth-surfaced cap 82 is provided on the outside of each upper fastener 58 to cover all the threaded ends 65 of the U-bolts. The caps 82 protect persons from coming into contact with the threaded ends 65 of the U-bolts 64, which ends are somewhat sharp. Each cap 82 has rounded corners and is secured in place over the ends 65 by a cable tie (not shown) which encompasses the cap and a diameter of the frame 34 and/or leg segment 37.

The lower fastener 60 has a single U-bolt 74 with threaded ends 75. A saddle clamp 76 is positioned over the threaded ends and held in place by nuts 78. For greatest stability, the lower fastener 60 should be near the bottom of the vertical section 37 of the leg 36 so that the lower fastener 60 is well below the upper fastener 58. For safety, the lower fasteners should be positioned so that the threaded ends of the U-bolts 74 extend inwardly, toward the center of the trampoline bed 40.

It is particularly helpful for the fasteners 58, 60 to be positioned so that all swage joints 38 are located between the upper and lower fasteners 58, 60. This arrangement will prevent the swage fittings from coming apart unintentionally, as is possible during energetic use of a trampoline for game playing. It is also an advantage of this system that it reinforces the legs of the trampoline and reduces the stresses on the welds between the frame 34 and legs sections 37. Although not preferred for general use, other fastener systems can be employed as described below.

The wall support portion 48 of each post 44 is covered with a layer 84 of padding made from a resilient foam material, with or without a fabric cover. The padding may be a rectangular sheet wrapped around the post 44 and secured by fasteners or may be tubular so that there is no seam. The illustrated foam is extruded closed cell polyethylene foam. Other resilient, weather-resistant foam materials could also be used. As explained below, the foam material serves not only as cushioning for a person who impacts one of the posts 44. The foam material is used as a part of a system for momentarily storing energy from remote impacts, so that portions of foam help rebound a person toward the center of the trampoline, even when the foam is not directly impacted by the person.

In the illustrated embodiment, an end cap 86 is provided as an upper extension of each post 44. The end cap has a rounded upper portion 88, a centrally-located neck portion 90 which is a circumference channel extending around the axis A of the post 44, and a downwardly-opening collar portion 91 which is located at the base of the cap and which is of greater inside and outside diameter than the neck portion 90. The upper portion 88 is substantially spherical for strength. The neck portion 90 is

hollow and sh[illegible]d to snugly fit over the upper end portion [illegible] of a post 44. The collar portion 91 is of sufficient inside diameter to receive, protect, and aid in securing the top of the padding layer 84. The cap 86 is made of a shatter-proof plastic material which is somewhat flexible at typical ambient temperatures so that the cap is capable of cushioning some impact energy.

A hook 92 is provided by an eye bolt which has a passageway 93 giving access to the center of the eye. In the illustrated embodiment, the hook is located on the end cap 86, but could be located elsewhere at or near the upper end portion 46 of the post 44. The eye bolt has a shank which extends through two vertically-aligned, registered holes through the post 44 and cap 86 at one side of the post 44. The threaded end of the shank is secured by a tee nut 94 which has a neck received in suitably-sized, registered holes through the post 44 and cap 86 at the opposite side of the post 44. Other forms of hook could be used at this location, and a hook could be secured differently, for example by one or more clevis pins extending both through a portion of the hook and through the post. A closed eye could also be used, but this would be less convenient because lines would need to be threaded through eyes during installation of a wall. The hook has several uses explained below.

A generally cylindrical wall 100 of a flexible material is suspended between the posts 44 to define a chamber 106 above the rebounding surface 40. The illustrated chamber is open at the top as shown in Fig. 1. The wall 100 has top and bottom edges 101, 102 and is made of a light-weight plastic sheet material, such as extruded plastic safety fencing, which has a unitary structure with numerous mesh-like openings 104. Woven netting, strong fabric, or other forms of plastic mesh may also be used, preferably with the top and bottom edges 101, 102 being reinforced by a hem or other finishing. Generally, the wall material will be a rectangular piece having a width which is the same as the height of the wall, and a length which is somewhat longer than the circumference of the enclosure. The openings should be no more than 2 inches across, in their largest dimensions, to prevent small children from getting their hands stuck in the openings and so that there is a sufficiently uniform surface against which balls of most any size can be thrown during game play. Preferably the openings will be at least 1 1/2 inched

across and spaced sufficiently closely that there is good visibility through the wall 100. The fencing may take many forms; the most common have patterns of openings that are diamond-shaped or rectangular. The most preferred for the wall 100 is a pattern of diamond-shaped openings spaced at 1 3/4 inches node-to-node. The fabric of the wall 100 and the other nonmetal elements described herein are best made of materials which are abrasion-resistant and which are resistant to weathering, e.g. by exposure to UV light. Suitable materials, include polypropylene, nylon, high density polyethylene, and Dacron polyester.

A support system is provided to hold the wall 100 in place. At the top, a flexible line 108 extends post-to-post near the top of the chamber 102. For each pair of adjacent posts 44, the posts are connected by a reach of the line 108. In the illustrated embodiment the line 108, although flexible, is only somewhat elastic. The line 108 thus allows the tops of the poles to move relative to one another, but the tops of two adjacent poles can not move away from each other to any great extent. The line 108 is made of a sturdy, weather-resistant material such as 1" nylon webbing. Nylon webbing is best suited because it has little elasticity and thus will not sag after it is installed. Webbing is better than rope for the line 108 since rope has a relatively low surface area which would tend to cut into and abrade the body of a person who bounced into contact with the line 108. Webbing has a relatively high surface area and automatically rotates so that a flat face of the webbing contacts any impacting body. The flat webbing face distributes resistive force over a greater portion of a person's body and is relatively nonabrasive.

The illustrated top line 108 is a single continuous piece. The ends of the top line 108 are secured together by a buckle 110 so that the top line is a continuous loop. This is a strong construction since the buckle 110 is the only fitting connected to the line. Tension in the line 108 can adjusted by using the buckle 110 to vary the circumference of the loop. The line 108 is mounted to chokingly surround the neck portion 90 of each end cap 86. As shown in Figs. 4 and 5, this is accomplished by slipping a loop 116 of the line 108 through a metal ring 114, and then lowering the loop 116 over the top 88 of the end cap 86 to a position where the loop 116 seats in the trough of the hook 92 and extends through the neck portion 90. After the line

108 is thus installed on all the end caps and pulled to a desired tension, each ring 118 maintains its loop 116 at a small diameter so that the loop 116 can not slide up out of the neck portion 90. The ring 114 is a welded steel chain link having inside dimensions of 1" x 3/8" and having rounded edges to minimize wear of the line 108 and to protect trampoline users from injury.

The wall 100 is secured to the upper line 108 along portions of the line 108 which extends between the post 44. The wall 100 can be secured to the line 108 in a variety of ways. When using mesh-like plastic safety fence, which has numerous openings 104, it is most convenient to weave the upper line 108 through a series of openings 104 near the top edge 101 of the wall 100. This arrangement is shown in Fig. 5. With a wall 100 of plastic safety fencing material, the top line 108 is woven through each opening along the top edge 101. The weaving can skip a few openings 104 opposite each of the end caps 88 to reduce stresses at points where the top line 108 extends from the fencing to a post 44.

A similar arrangement is used to secure the bottom edge 102 of the wall 100. A strap of one inch polypropylene webbing 120 extends post-to-post at an elevation near that of the frame 34. A reach of the webbing 120 thus extends between each pair of adjacent posts 44. The webbing additionally can be secured to the frame 34 at intervals between the posts 44, by cable ties (not shown) or other fasteners, to prevent the wall from stretching to a position outwardly of the frame 34. Alternatively, the webbing 120 can be secured to the trampoline bed at the inner ends of the springs 39 which support the fabric 40 or could be secured to the annular pad (not shown) which is commonly provided over the springs. The ends of the webbing 120 are secured together by a buckle 121 so that the webbing 120 is a continuous loop.. Tension in the webbing 120 can be adjusted by using the buckle 121 to vary the circumference of the loop. The webbing 120 is connected to the base of the wall 100. With a wall of plastic safety fencing, the webbing 120 is woven through a series of openings 104 near the bottom edge 102 of the wall material. At each post 44, a loop 122 of the webbing 120 extends out of the wall 100 and is held to the post 44 by a fastener 124 such as a cable tie. The fastener should be mounted so that the loop 122 cannot move a substantial distance upwardly

along the post [redacted] A loop 122 should not extend from two [redacted] immediately adjacent openings in fencing material, since this would stress the fabric near the post. Instead, some space should be allowed between the two points where the loop 122 extends from the wall 100, so that tensioned webbing 120 does not cut into the wall 100 at those points. As an alternative, the bottom edge of the fencing 100 could be secured directly to the frame 34 by a series of cable ties (not shown), without use of webbing 120. Connectors from the frame to the bottom strap can be threaded through openings pierced through perimeter padding 126.

A particularly useful feature of this invention is a securement system which holds intermediate portions of the wall 100 to the posts 44. As best seen in Fig. 5, an elastic cord 128, of the type sometimes referred to as a bungee cord or shock cord, is secured at each end so that it extends vertically along the wall support portion 48 of a post 44. In the illustrated embodiment, one end of the cord 128 has a loop received in the trough of the hook 92 near the top of the post 44 and, at its other end, has a loop connected to the lower leg fastener 58. Between its ends, the cord 128 extends in serpentine fashion through openings 104 in the wall material so that loops of the cord 128 are alternately provided on the inside and the outside of the wall 100. Outside loops 130 of each cord are aligned with one of the posts 44. Also extending along the wall support portion 48 of each post 44 is a helical wrap of webbing 134. In the illustrated embodiment, this webbing is a length of one half inch polypropylene webbing with a loop 135 at its top end. The bottom end is secured to the fastener 58, while the top loop 135 is supported on the hook 92. The strapping 134 extends helically around the outside of the padding 84 and through loops 130 to hold the cord 128 against the padding 84. The strap 134 is wrapped sufficiently tightly to hold the cord 128 against the padding 84, but not so tightly that the padding is completely crushed.

Because the wall material 100 is longer than the circumference of the enclosure, ends portions 137, 138 of the wall fabric overlap as shown in FIG. 6B. At the top, the end portions 137, 138 are secured by weaving of the line 108 through openings 104 at the top edge of the end portions. A horizontal row of openings at the tops of the two end portions 137, 138 are held with the openings in registry, and

the line 108 is threaded through adjacent openings in the rows, in serpentine fashion, so that the top edges of the end portions 137, 138 are in effect sewn together by the top line 108. At the bottom, the outer end portion 138 is secured by weaving of the line 120 through openings 104 at the bottom edge of the end portion. The bottom of the inner end portion 137 is not secured. A piece of 1/2" nylon webbing 139 is woven in serpentine fashion downwardly from the top line 108 through both the end portions 137, 138 to a location 140 between the top and bottom lines 108, 120. This webbing 139 thus sews upper regions of the end portions together. The nylon webbing continues down from the location 140 secured only to the inner end portion 137. Thus the end portions 137, 138 are not sewn together below the location 140, thus providing a flap door 141 which may be bent inwardly to permit access to the chamber 106. A free extension 142 of the webbing 139 can extend from the bottom of the inner end portion 137 to be used for tying down the bottom of the door. In the illustrated embodiment, the extension is secured by wrapping it around the bottom line 120 at the base of the door and then tying it to a removed area of the bottom line 120.

The illustrated enclosure system has walls which are strong but highly resilient. The fabric of the wall 100 is extruded plastic safety fencing which is flexible, but only somewhat elastic. Elasticity is provided by other elements. In particular, the cord 128 is elastic, the padding 84 is comprised of a plastic foam material which compressible and elastic, and the posts 44 are flexible.

When a person jumps from the trampoline surface 40 and hits the wall 100 of the enclosure, the wall moves a short distance in the direction of the force applied by the user and thereby absorbs energy and cushions the shock. All of the posts 44, because they are linked together at the top by the top line 108, flex toward the impacted portion of the wall panel. Cord loops 130 are stretched on those posts 44 which are near the region of impact. And, those loops 130 pull and tension the associated strapping 134 into the padding 84 so that the padding compresses. These actions allow the fence 100 to flex and conform to the body of the person who impacted the fence. The conformance of the fence distributes the resistive force on the person's body to provide enhance cushioning. Also, because of this arrangement

of elements, a portion of the impact energy is stored in the flexed posts 44, in the elongated cords 130, and in the crushed padding 84. This stored energy is promptly released as a force which urges the impacted portion of the wall back towards the center of the chamber 106, pushing the trampoline user with it.

To provide elasticity in this system, the posts 44 should not be rigid. The posts should be sufficiently strong that impacts by trampoline users will not permanently bend the poles. But, the posts 44 should be able to flex to some extent when a trampoline user impacts the wall 100. For ease of construction and low cost, the illustrated posts 44 are made of tubular steel. Other materials, such as pvc plastic, fiberglass and carbon fiber, can be used if they have appropriate strength and flexibility characteristics. As mentioned above, the strapping 134 should not be applied so tightly that it completely crushes the padding 84. And, the padding 84 should be made using a resilient foam. It is a further advantage of this securement system that the elasticity of the loops 130 helps to prevent the wall fabric from ripping.

As most clearly seen in Fig. 7, it is useful to provide cross-bracing straps 144 to limit the movement of adjacent posts toward or away from another. A preferred cross-bracing material is substantially inelastic nylon webbing; plastic or metal cable could also be used. The cross-bracing extends, in pairs of crossing reaches, from positions near the upper end portions 46 of two adjacent posts 44 to positions which are near the elevation of the frame 34, so that an X-shaped pair of straps extend between each pair of adjacent posts 44. The cross-bracing for a pair of adjacent posts 44 can be provided by a single length of strapping which extends in a partial figure-eight pattern among four rings including a top ring 148 and a bottom 149 on each post. The two ends of the strap 144 are secured by a buckle 152.

It is possible to tune the flexibility of various elements of the enclosure system. This can be done by adding or removing one or more sections of flexible cord, or other type of spring, to a run of inelastic strapping. For example, tension springs, such as shock cord segments, could be added to the line 108, the strap 120, the strapping 134, and/or the cross bracing 144. The addition of a short section of flexible cord imparts a small amount of elasticity to such members. For greatest

adjustability, such a member can be constructed from a series of short runs of inelastic webbing, instead of from one continuous run. A tension spring element, such as a shock cord section, can be included in each short run as desired to tune flexibility.

The embodiment shown in Figs. 7 and 8 is similar to the embodiment shown in Figs. 1-6, except that the enclosure system has fewer posts 44. Instead of being mounted on every vertical trampoline leg section 37, one post 44 is mounted on every other vertical leg section 37. This illustrates that the number of posts 44 and where they are mounted will depend on the size of the trampoline and the number of its legs, and the preferences of the trampoline owner. But, using the same basic set of parts, an enclosure kit can be assembled for trampolines of almost every size and shape.

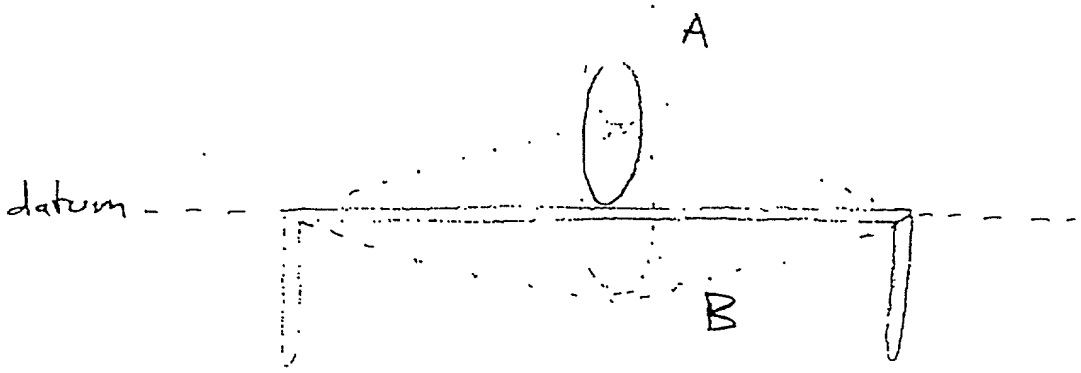
Trampoline Court Specification Sheet

FOSOEO" E.Z200360

Category	Part Description	Dimensions	Amount	Specifications
Webbing	1" Nylon, Yellow, cut, Type 25 (upper)	45'	1	4500 lb. tensile breaking strength
	1" Polypropylene, Yellow, cut, Type 600 (lower)	45'	1	1100 lb. tensile breaking strength
	1/2" Polypropylene, Red, cut, Type 406	11'	9	375 lb. tensile breaking strength
	1/2" Polypropylene, Red, cut, Type 406	3'	8	375 lb. tensile breaking strength
Shock Cord	1/4" Shock cord	7'	7	180 lb. tensile breaking strength
Steel Tubing 16 ga=.055 min	Upper Support Tube, 1 3/4" O.D., 16 ga., galvanized	3'	8	Cold rolled, 1008-1010 steel
	Lower Support Tube, 1 3/4" O.D., 16 ga., galvanized	6'	8	Cold rolled, 1008-1010 steel
Netting	Co-axial polypropylene fence, 1 1/2" x 2" mesh size	46' x 6'	1	130 lb. tensile breaking strength
Foam Tubing	Expanded polyethylene foam, 5/8" wall, 1.75" I.D.	6'	8	Closed cell, extruded, 2 lb. density
Misc Hardware	Ball End Caps, 90 Durometer, Polyvinyl Chloride (PVC)	2.75" x 2.125" x 1"	8	Made by dipping process
	U-bolt Cover Caps, 90 Durometer, Polyvinyl Chloride (PVC)	3.125" x 2.75" x 1.371"	8	Made by dipping process
	Self-tapping sheet metal screw	#12 x 5/8"	8	
	Eye Bolt, 5/16-18 w/ Zinc, C1018	1.825"	8	
	Tee Nut, 5/16-18 (prongless)	0.375"	8	
	Welded chain link (individual)	1" x 3/8"	12	
	Welded chain link (2 links)	1" x 5/8"	7	
	D-ring	1"	2	560 lb. tensile breaking strength
	Locking buckle	1"	1	360 lb. tensile breaking strength
Clamps/Saddles	Saddle clamp	1.75" I.D.	24	
U-Bolts	Cust. Lower U-Bolt, 5/16"	4.125" X 2.08"	8	
	Cust. Upper U-Bolt, 5/16"	4.375" X 2.37"	8	
Nuts	Nylock Nut, 5/16-18		48	

Energy Absorbtion Factor of Panels: 0.50 to 0.95 (50% to 95% of impact energy is absorbed)
Spring Rate of Support Poles: 5 lb/in to 45 lb/in (a measure of the stiffness of the poles)

RAMPOLINE MECHANICS

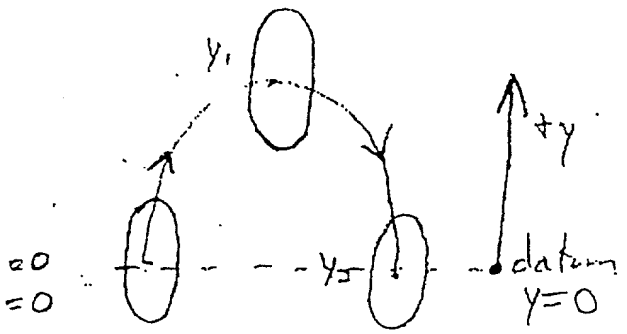


he motion of bouncing on a trampoline is
ined by two distinct phases. Phase A occurs while
ncing up into the air and is described by projectile
tion. Phase B occurs while rebounding on the bed
the trampoline and is described by standing
ve mechanics. The two phases are marked by the
mpoline bed (or the bottom of the user's feet) passing
datum line located at the position of the bed
ile at rest.

he energy added to the system can be calculated by taking
r the difference in the potential energies (height of the
s) or the kinetic energies (velocities while passing the datum)
a bounce and its preceding bounce and adding energy
in damping.

ximate calories burned is a function of both the
al energy output to the system, and the body's ability
convert nutritional calories into energy.

Part A - Projectile Motion



Assumptions:
- Newtonian mechanics (ie. non-relativistic equations, since velocities are much less than 0.3c)
- Air drag on the body is neglected
- Vertical motion only

Variables:
- y = vertical position relative to datum
- t = time, starting at t=0 when user's feet travel upward from the datum
- V = velocity
- $t_2 - t_0$ = total time in the air
- a = acceleration

Constants
- g = -32.2 ft/s² or -9.81 m/s² (acceleration of gravity)
- c = speed of light

Equations

$$y(t) = y_0 + Vt + at^2$$

$$y(t) = y_0 + v_0 t + at^2$$
$$y(t) = 0 + v_0 t + gt^2$$
$$y(t) = v_0 t + gt^2$$
$$v(t) = v_0 + 2gt$$
$$v_0 = v - 2gt$$

t_0: $v = v_0$

t_2: $v = -v_0$

at t_1: $v = 0$

$$0 = v_0 + 2gt$$
$$t = \frac{-v_0}{2g}$$
$$y = v_0\left(\frac{-v_0}{2g}\right) + g\left(\frac{-v_0}{2g}\right)^2$$
$$y = \frac{-v_0^2}{2g} + \frac{v_0^2}{4g} = \frac{-v_0^2}{4g}$$

at t_2: $y = 0$

$$gt^2 + v_0 t - y = 0$$

$gt^2 + v_0 t = 0$
$t(gt + v_0) = 0$
$t = 0$ or t

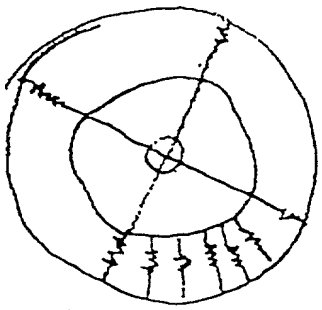
$$t = \frac{-v_0 \pm \sqrt{v_0^2 - 4 \cdot g \cdot (-y)}}{2 \cdot g}$$

$$t = \frac{-v_0 \pm \sqrt{v_0^2}}{2g}$$

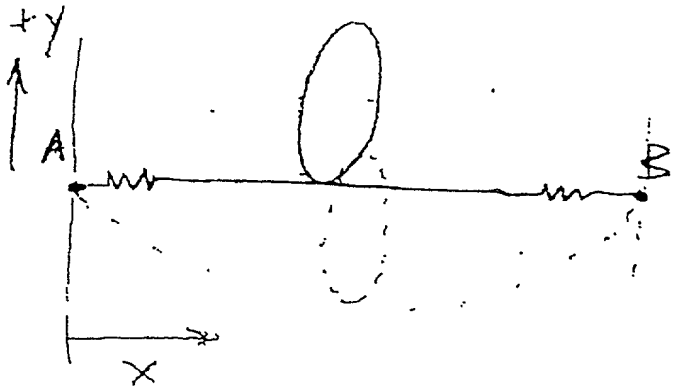
$$t = \frac{-v_0 \pm v_0}{2g} = \frac{-v_0}{g} \text{ or } \cancel{0}$$

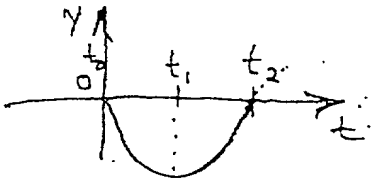
At t_1: $t_2 - t_0 = \frac{-v_0}{g} - 0 = \frac{-v_0}{g}$

Part B - Standing wave mechanics



(96 springs)





Variables

x: horizontal position
y: vertical position
ω = angular velocity (rad)
f = frequency
T = period
λ = wavelength
μ = mass per unit length
F = vertical force
L = length of string
M = mass of user (m) + mass of bed
$\Delta t_B = t_2 - t_0$

Equations

$\omega = 2\pi f$

$T = 1/f = 2\pi/\omega$

$v = \lambda f = \lambda / T$

$v = \sqrt{\frac{F}{\mu}}$

$f_n = n\frac{v}{2L} = nf_1 \quad (n = 1, 2, 3 \ldots)$

$f_1 = \frac{1}{2L}\sqrt{\frac{F}{\mu}}$

$t_2 - t_0 = \frac{1}{2}T$

$\Delta t = T/2 = \frac{1}{2f}$

$f = \frac{1}{2L}\sqrt{\frac{F}{\mu}}$

$\mu = \frac{M}{L}$

$\Delta t = \frac{x}{2}\left(\frac{2L}{1}\sqrt{\frac{M}{FL}}\right)$

$f = \frac{1}{2L}\sqrt{\frac{FL}{M}}$

$\Delta t_B = L\sqrt{\frac{M}{FL}} = \sqrt{\frac{ML^2}{FL}} = \sqrt{\frac{ML}{F}}$

$$\Delta t_{Tot} = \Delta t_A + \Delta t_B$$

$$\Delta t_{Tot} = -\frac{V_o}{g} + \sqrt{\frac{2ML}{F}}$$

$$V_o = g\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot}\right)$$

Kinetic energy $KE = \frac{1}{2} m V_o^2$

Energy added to system $\Delta E = KE_2 - KE_1$

$$\Delta E = \frac{1}{2} m V_{o_2}^2 - \frac{1}{2} m V_{o_1}^2 = \frac{1}{2} m \left(V_{o_2}^2 - V_{o_1}^2\right)$$

$$\Delta E = \frac{1}{2} m \left[\left(g\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_2}\right)\right)^2 - \left(g\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_1}\right)\right)^2\right]$$

$$\Delta E = \frac{1}{2} m g^2 \left[\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_2}\right)^2 - \left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_1}\right)^2\right]$$

Calories Burned

Approx conversion rate for humans $C = 0.20 = 20\%$

$$\Delta E = (Calories)(C)$$

$$Calories = \frac{\Delta E}{C} = 5 \cdot \Delta E$$

A variety of new games have been developed to make use of the features of the enclosure system of the present invention. These games in some instances employ accessories to the basic enclosure system, as described below.

Tramp Chase. Players start in diagonal quadrants. At least two cords are stretched across a court, and hoops or other obstacles may be attached to them. Someone says go, and the players race around in the same direction, either over or under each of the cords, which the players have determined. Player wins by catching to and tagging his opponent.

Tramp Ball. Players are on either side of the net stretched across the court. Net is placed higher for more challenge. Ball is soft Nerf-type about the same size as a soccer ball. Players throw or hit it over the net. If opponent misses the ball and hits the back most panel of the court a point is scored. Opponent has one bounce of his ball on the trampoline or less to catch ball and throw or hit it back to the other side.

Tramp Shot. Two bungee cords stretched across the court, one high and one low, suspend a target. The target consists of three disks which may rotate. A small, soft, bouncy Nerf-type ball about 4 inches minimum is used. Players may move anywhere in the court. A player serves by hitting the ball at the target, if it misses, the opponent gets a point and the serve.

Tramp Back. Players start anywhere in the court. Target is a large (3' diameter) plastic disk mounted securely against one pole. Ball is small, soft, and bouncy but lightweight, pneumatic-type plastic ball, about 4 inches in diameter. Players may move around in the court. One serve is by hitting or throwing the ball against the target. Opponent has one bounce of the ball against the trampoline to catch the ball, and may only take one step before throwing the ball back at the target.

Tramp Scotch. Many cords are cris-crossed across the court at the same or varying heights. Players must jump over one square to another in a player-determined sequence. For more challenge, players may not touch any of the cords when making the jumps.

Tramp Pass. Two circular targets (3' in diameter) are securely attached to opposing poles in the court. Each is covered with Velcro covered the hook side of

Velcro fastener. A small, soft, medium-weight ball is covered with Velcro loop fastener. A cord along the surface of the tramp separates the two players. Players throw the ball at the opponent's target. The opponent tries to block or catch the ball. A point is scored if the ball sticks to the target. Once the opponent has the ball, he can throw the ball at the other target. For more challenge use more balls.

Tramp Tag. Three to eight balls of varying or equal size and bounciness are used. Players bounce about the court in any direction. They start with 10 balls losing one each time a ball touches them. The last player left with a ball wins. Once a player is out he leaves the court. For more challenge, use elastic cords stretched across the court obstacles.

Tramp Basket. A cord is stretched across the court at below waist height. A small basket with a net is securely attached to one pole. A soft, bouncy Nerf-type ball that can easily pass through the net is used. Players either take turns a predetermined number of times and the one with the most baskets wins or a half-court game can be played. In the half-court game, the player on offense shoots behind the cord. The player on defense may not goal tend.

Tether Tramp I. The ball is suspended from above the court by a bungee cord. A cord also extends from the top cord down to a cord across the bottom. The ball is a medium-sized, bouncy, light-weight, plastic ball. Each player is in one-half of the court as marked by the lower cord, and remains there the entire game. A player wins by hitting the ball until it wraps tightly and completely around the vertical cord suspended in the center of the court.

Tramp Duel. Two nets are securely attached to poles located across from one another. One cord runs across the court at below waist-height, dividing the court into two halves, with the nets at the back of each. The ball is medium-sized and soft. Each player remains in his half during the entire game. Points are scored when a player makes a basket. The defender may block a shot, but may not goal-tend.

High Tramp. A cord is stretched across the net, starting out at waist height. Just like the High Jump, each player attempts to jump over the cord from one side to the other, without touching the cord. Each player gets three attempts to jump each

height. If both succeed, the cord is raised. The player to make the greatest height wins.

Tether Tramp II. Similarly to Tether Tramp I, the ball is attached to a cord which is suspended from an overhead cord. The object is to throw the ball around the horizontal cord. Each player tries to wrap up the ball in opposite directions.

Tramp Touch. A cord is stretched across the court. From it, balls are hung at graduated heights. This allows small children the challenge of jumping up and hitting them at progressively greater heights. They can see if they really did touch or not because the ball will be swinging. For greater challenge with larger kids, hang the balls from the upper part of the TrampBrella poles.

Tramp Throw. Cords are stretched in a grid across the top of the court. Game is played by jumping up through a certain square and throwing the ball down through another specific square.

Tramp Slide Each player attempts to slide one of two soft "buoys" across to the other side of the net. If it hits the other side without the opponent blocking it, the player scores a point. For additional challenge, a cord separating the two buoys for both players can be added. This requires the players to jump over the cord to get between the two buoys.

Tramp Hook. Each player has a different colored set of "hooks." The grid at the top of the court is divided into different sections, and they score by putting their hooks in their color-coded spot for each section. Each player is in a separate section, and they rotate when one completes his section.

Tramp Jump. An ordinary garden hose is attached to a water-pressure driven motor suspended in the center of the court. Attached to the motor is a soft rubber foam rod with a soft-weight at one end. The motor turns the foam rod around the court, and the exiting water splashes around the court. Players avoid the foam rod by jumping or ducking. Its height may be varied.

Speed Ball. Two players have two different colored sets of balls, and a matching colored basket. They race to grab balls of their color (only one may be carried at a time) out of the center basket and put it into their own. Variations can

be played with no center basket, or with players stealing or blocking each others balls.

Jam Ball (one or two players). The enclosure is equipped with two opposed basket ball goals mounted, for example, as shown in FIG. ___. A center line is provided on the trampoline surface at a distance one half way between the goals. A lightweight pneumatic ball is used. Each player defends one goal and shoots for the other. A player with the ball may dribble as in basket ball. To shoot, a player must bounce the ball off the trampoline surface, jump up and catch the bounced ball in midair, and then shoot the ball at the goal before either the player or the ball lands on the surface. To score a point, the player must start the jump from the side of the centerline that is opposite the target goal. For a higher scoring game, it can be established that a player gets an additional bounce, before shooting, after gaining possession of the ball. Goal tending is not permitted. Rebounding determines control of the ball as in basketball.

Having h[illegible]n described preferred embodiments of th[illegible]vention, it is anticipated that suitable modifications and additions may be made thereto within the scope of the invention.

For example, there are alternative methods for securing the top line 108 to the posts 44. As shown in FIG. 8, the line 108 can be wrapped around the neck 90 which will keep the line in place without use of a ring.

The attachment of the wall to the posts could be different. Although not preferred, the wall fabric could be attached to the posts with cable ties. Or, as shown in FIG. 9, the wall could be secured directly to the wall with a helical wrap, without an intermediate cord such as bungee cord 128.

Suitable wall-support posts could be mounted so that they extend upwardly from a trampoline frame, and do not extend to the ground. A bracket for this purpose is shown in FIG. 10. With this system, a trampoline support leg is received in the downwardly-facing opening __, the trampoline frame is received in the horizontally-facing openings __, ___, and the wall support post is received in the upwardly-facing opening __. The bracket can be designed to receive free ends of four separate tubing members as illustrated. Or, a passage way could be provided through the bracket, horizontally and/or vertically, so that the bracket could be secured at a location between the free ends of a tube. For example, if the bracket has a vertical passageway, a single tube could extend through the passageway and, if the tube is sufficiently long, be used for both the trampoline leg and the wall support post. Likewise, if there is a horizontal passageway, the bracket could be secured to a frame segment at a location between the ends of the segment. The bracket shown in FIG. 10 is made of two sheet metal members which bolt together to sandwich tube members therebetween. Other suitable brackets, as shown in FIGs. 11-12, are a metal cross connecters of the type used in plumbing joints.

An activity computer could be provided to process data acquired from sensors, of the type shown in FIGS. 13-14, attached to the trampoline and enclosure system. The computer could be linked to a keypad or other user input device. Such a computer would use the inputted information, such as time intervals between

bounces and number of bounces, to record and calculate information of use to the user, such as calories consumed by the user, game scores, and the like.

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Background of the Invention

The present invention concerns wall structures used with trampolines to protect trampoline users and to provide new uses for trampolines.

In the past, trampolines have been used for a variety of athletic and recreational purposes. However, injuries have sometimes resulted when a person jumping on a trampoline would land too near the boundary of the rebounding surface and strike the trampoline frame or fall off an elevated trampoline.

To reduce such injuries, devices have been made to form a wall around the perimeter of a trampoline bed so that when a jumper lands too near the edge, the wall prevents the jumper from falling off. For the most part, these devices have been passive walls which do not assist a jumper, except for providing basic protection, and which do not add anything to the experience of using a trampoline. Thus, there is a need for a trampoline enclosure system that does more than provide basic, wall-like protection.

Summary of the Invention

The present invention is a wall enclosure system which not only provides protection for a trampoline jumper, but also actively responds to an impact by urging the jumper back toward the center of the rebounding surface of the trampoline.

The present system has several unique structural features which make the wall active in response to an impact. These features also make the system easy to install and universally applicable to almost all types of trampolines. The construction of the present system also makes it possible to mount a variety of game accessories so that a jumper can use the trampoline for purposes not possible in the past. A variety of new games are made possible by these constructions.

These and other unique features of the invention will be understood with referenced to the following detailed description and drawings.

APPENDIX B

In the Drawings

Fig. 1 is an oblique view showing a trampoline apparatus including an enclosure system according to the present invention.

Fig. 2 is top plan view of the apparatus shown in Fig. 1.

Fig. 3 is an enlarged oblique view of a leg portion of the apparatus shown in Fig. 1.

Figs. 4, 4a are enlarged partial oblique views of a wall portion of the apparatus shown in Fig. 1.

Fig. 5 is an enlarged partial side view of the apparatus shown in Fig. 1.

Figs. 6, 6a are an enlarged views of an end cap shown in Fig. 5.

Fig. 6b illustrates a door structure.

Fig. 7, 7a are views of another trampoline apparatus including an enclosure system according to the present invention.

Fig. 8 is an oblique schematic view of the apparatus shown in Fig. 7.

Figs. 9-14 are views of various alternative constructions and accessories.

Detailed Description

Trampolines come in a variety of configurations and sizes. A popular trampoline is shown in Figs. 1-2. The illustrated trampoline has a circular frame 34 supported by multiple U-shaped tubular legs 36. The U-shaped legs have two vertically-extending sections 37 connected by a horizontal section which rests on the ground. The upper ends of the vertical leg sections 37 are secured to the frame 34 by welds. For ease in storage, it is convenient for the legs to be removable. This is made possible by providing a swage joint 38 in each vertical leg section 37. A plurality of spring members 39 tautly attach a sheet of sturdy fabric 40 to the frame 34 so that the fabric provides a rebounding surface or bed. Other types of trampolines, having variations in structure such as individual legs secured by bolts or the like, will equally benefit from the present invention.

The trampoline is augmented by an enclosure system 30 which provides a protective and interactive environment for the trampoline user. The system 30 includes a plurality of posts 44 which extend vertically. Each post 44 is secured to a vertical section 37 of one of the legs 36. For the purpose of this disclosure, each

post 44 is re[redacted]d to as having an upper end portion 46, [redacted]all support portion 48 located above the level of the rebounding surface 40, a lower portion 50 located below the surface 40, and a lower end portion 52 which extends to ground level. These designations refer to locations on a post 44, not to separable sections. In the illustrated embodiment, each post 44 is made in two sections and connected at a swage joint 54, with the two pieces secured together by a set screw. A single-piece post could also be used, or a post comprised of more than two pieces secured end-to-end with swage fittings and set screws. A multi-piece post is easier to package and ship than a unitary post.

Each post is connected to a leg by two leg fasteners 58, 60. As best seen in Fig. 3, the upper fastener 58 is an assembly having two U-bolts 64. The U-bolts have threaded ends 65. In use, the U-bolts are positioned to encompass the frame 34 on opposite sides of the vertically extending portion 37 of a leg 36. Two saddle clamps 66 are respectively positioned above and below the frame 34. Each clamp 66 has two openings which respectively receive one threaded end 65 of each of the two U-bolts. Nuts 68 are tightened onto the threaded ends 65 of the U-bolts 64 in order to secure the post 44 to the frame 34. To provide a degree of flexibility in the fasteners 58, stiff compression springs (not shown) could be provided between the saddle clamps 66 and nuts 68. In this arrangement, locking nuts would be used, and the nuts would not be tightened to that extent that the springs were completely crushed. With such springs in place, a post 44 could be moved a short distance away from the frame 34 when a person bounced against the post from inside the chamber 106. The additional movement of the pole would help cushion the impact on the person.

A rigid, smooth-surfaced cap 82 is provided on the outside of each upper fastener 58 to cover all the threaded ends 65 of the U-bolts. The caps 82 protect persons from coming into contact with the threaded ends 65 of the U-bolts 64, which ends are somewhat sharp. Each cap 82 has rounded corners and is secured in place over the ends 65 by a cable tie (not shown) which encompasses the cap and a diameter of the frame 34 and/or leg segment 37.

The l[redacted] fastener 60 has a single U-bolt 74 with [redacted]aded ends 75. A saddle clamp 76 is positioned over the threaded ends and held in place by nuts 78. For greatest stability, the lower fastener 60 should be near the bottom of the vertical section 37 of the leg 36 so that the lower fastener 60 is well below the upper fastener 58. For safety, the lower fasteners should be positioned so that the threaded ends of the U-bolts 74 extend inwardly, toward the center of the trampoline bed 40.

It is particularly helpful for the fasteners 58, 60 to be positioned so that all swage joints 38 are located between the upper and lower fasteners 58, 60. This arrangement will prevent the swage fittings from coming apart unintentionally, as is possible during energetic use of a trampoline for game playing. It is also an advantage of this system that it reinforces the legs of the trampoline and reduces the stresses on the welds between the frame 34 and legs sections 37. Although not preferred for general use, other fastener systems can be employed as described below.

The wall support portion 48 of each post 44 is covered with a layer 84 of padding made from a resilient foam material, with or without a fabric cover. The padding may be a rectangular sheet wrapped around the post 44 and secured by fasteners or may be tubular so that there is no seam. The illustrated foam is extruded closed cell polyethylene foam. Other resilient, weather-resistant foam materials could also be used. As explained below, the foam material serves not only as cushioning for a person who impacts one of the posts 44. The foam material is used as a part of a system for momentarily storing energy from remote impacts, so that portions of foam help rebound a person toward the center of the trampoline, even when the foam is not directly impacted by the person.

In the illustrated embodiment, an end cap 86 is provided as an upper extension of each post 44, The end cap has a rounded upper portion 88, a centrally-located neck portion 90 which is a circumference channel extending around the axis A of the post 44, and a downwardly-opening collar portion 91 which is located at the base of the cap and which is of greater inside and outside diameter than the neck portion 90. The upper portion 88 is substantially spherical for strength. The neck portion 90 is

hollow and s[redacted]d to snugly fit over the upper end portio[redacted] of a post 44. The collar portion 91 is of sufficient inside diameter to receive, protect, and aid in securing the top of the padding layer 84. The cap 86 is made of a shatter-proof plastic material which is somewhat flexible at typical ambient temperatures so that the cap is capable of cushioning some impact energy.

A hook 92 is provided by an eye bolt which has a passageway 93 giving access to the center of the eye. In the illustrated embodiment, the hook is located on the end cap 86, but could be located elsewhere at or near the upper end portion 46 of the post 44. The eye bolt has a shank which extends through two vertically-aligned, registered holes through the post 44 and cap 86 at one side of the post 44. The threaded end of the shank is secured by a tee nut 94 which has a neck received in suitably-sized, registered holes through the post 44 and cap 86 at the opposite side of the post 44. Other forms of hook could be used at this location, and a hook could be secured differently, for example by one or more clevis pins extending both through a portion of the hook and through the post. A closed eye could also be used, but this would be less convenient because lines would need to be threaded through eyes during installation of a wall. The hook has several uses explained below.

A generally cylindrical wall 100 of a flexible material is suspended between the posts 44 to define a chamber 106 above the rebounding surface 40. The illustrated chamber is open at the top as shown in Fig. 1. The wall 100 has top and bottom edges 101, 102 and is made of a light-weight plastic sheet material, such as extruded plastic safety fencing, which has a unitary structure with numerous mesh-like openings 104. Woven netting, strong fabric, or other forms of plastic mesh may also be used, preferably with the top and bottom edges 101, 102 being reinforced by a hem or other finishing. Generally, the wall material will be a rectangular piece having a width which is the same as the height of the wall, and a length which is somewhat longer than the circumference of the enclosure. The openings should be no more than 2 inches across, in their largest dimensions, to prevent small children from getting their hands stuck in the openings and so that there is a sufficiently uniform surface against which balls of most any size can be thrown during game play. Preferably the openings will be at least 1 1/2 inched

across and s[illegible]ed sufficiently closely that there is good v[illegible]ility through the wall 100. The fencing may take many forms; the most common have patterns of openings that are diamond-shaped or rectangular. The most preferred for the wall 100 is a pattern of diamond-shaped openings spaced at 1 3/4 inches node-to-node. The fabric of the wall 100 and the other nonmetal elements described herein are best made of materials which are abrasion-resistant and which are resistant to weathering, e.g. by exposure to UV light. Suitable materials, include polypropylene, nylon, high density polyethylene, and Dacron polyester.

A support system is provided to hold the wall 100 in place. At the top, a flexible line 108 extends post-to-post near the top of the chamber 102. For each pair of adjacent posts 44, the posts are connected by a reach of the line 108. In the illustrated embodiment the line 108, although flexible, is only somewhat elastic. The line 108 thus allows the tops of the poles to move relative to one another, but the tops of two adjacent poles can not move away from each other to any great extent. The line 108 is made of a sturdy, weather-resistant material such as 1" nylon webbing. Nylon webbing is best suited because it has little elasticity and thus will not sag after it is installed. Webbing is better than rope for the line 108 since rope has a relatively low surface area which would tend to cut into and abrade the body of a person who bounced into contact with the line 108. Webbing has a relatively high surface area and automatically rotates so that a flat face of the webbing contacts any impacting body. The flat webbing face distributes resistive force over a greater portion of a person's body and is relatively nonabrasive.

The illustrated top line 108 is a single continuous piece. The ends of the top line 108 are secured together by a buckle 110 so that the top line is a continuous loop. This is a strong construction since the buckle 110 is the only fitting connected to the line. Tension in the line 108 can adjusted by using the buckle 110 to vary the circumference of the loop. The line 108 is mounted to chokingly surround the neck portion 90 of each end cap 86. As shown in Figs. 4 and 5, this is accomplished by slipping a loop 116 of the line 108 through a metal ring 114, and then lowering the loop 116 over the top 88 of the end cap 86 to a position where the loop 116 seats in the trough of the hook 92 and extends through the neck portion 90. After the line

108 is thus [illegible]lled on all the end caps and pulled to a d[illegible]ed tension, each ring 118 maintains its loop 116 at a small diameter so that the loop 116 can not slide up out of the neck portion 90. The ring 114 is a welded steel chain link having inside dimensions of 1" x 3/8" and having rounded edges to minimize wear of the line 108 and to protect trampoline users from injury.

The wall 100 is secured to the upper line 108 along portions of the line 108 which extends between the post 44. The wall 100 can be secured to the line 108 in a variety of ways. When using mesh-like plastic safety fence, which has numerous openings 104, it is most convenient to weave the upper line 108 through a series of openings 104 near the top edge 101 of the wall 100. This arrangement is shown in Fig. 5. With a wall 100 of plastic safety fencing material, the top line 108 is woven through each opening along the top edge 101. The weaving can skip a few openings 104 opposite each of the end caps 88 to reduce stresses at points where the top line 108 extends from the fencing to a post 44.

A similar arrangement is used to secure the bottom edge 102 of the wall 100. A strap of one inch polypropylene webbing 120 extends post-to-post at an elevation near that of the frame 34. A reach of the webbing 120 thus extends between each pair of adjacent posts 44. The webbing additionally can be secured to the frame 34 at intervals between the posts 44, by cable ties (not shown) or other fasteners, to prevent the wall from stretching to a position outwardly of the frame 34. Alternatively, the webbing 120 can be secured to the trampoline bed at the inner ends of the springs 39 which support the fabric 40 or could be secured to the annular pad (not shown) which is commonly provided over the springs. The ends of the webbing 120 are secured together by a buckle 121 so that the webbing 120 is a continuous loop.. Tension in the webbing 120 can be adjusted by using the buckle 121 to vary the circumference of the loop. The webbing 120 is connected to the base of the wall 100. With a wall of plastic safety fencing, the webbing 120 is woven through a series of openings 104 near the bottom edge 102 of the wall material. At each post 44, a loop 122 of the webbing 120 extends out of the wall 100 and is held to the post 44 by a fastener 124 such as a cable tie. The fastener should be mounted so that the loop 122 cannot move a substantial distance upwardly

along the po[redacted]. A loop 122 should not extend from tw[redacted]mediately adjacent openings in fencing material, since this would stress the fabric near the post. Instead, some space should be allowed between the two points where the loop 122 extends from the wall 100, so that tensioned webbing 120 does not cut into the wall 100 at those points. As an alternative, the bottom edge of the fencing 100 could be secured directly to the frame 34 by a series of cable ties (not shown), without use of webbing 120. Connectors from the frame to the bottom strap can be threaded through openings pierced through perimeter padding 126.

A particularly useful feature of this invention is a securement system which holds intermediate portions of the wall 100 to the posts 44. As best seen in Fig. 5, an elastic cord 128, of the type sometimes referred to as a bungee cord or shock cord, is secured at each end so that it extends vertically along the wall support portion 48 of a post 44. In the illustrated embodiment, one end of the cord 128 has a loop received in the trough of the hook 92 near the top of the post 44 and, at its other end, has a loop connected to the lower leg fastener 58. Between its ends, the cord 128 extends in serpentine fashion through openings 104 in the wall material so that loops of the cord 128 are alternately provided on the inside and the outside of the wall 100. Outside loops 130 of each cord are aligned with one of the posts 44. Also extending along the wall support portion 48 of each post 44 is a helical wrap of webbing 134. In the illustrated embodiment, this webbing is a length of one half inch polypropylene webbing with a loop 135 at its top end. The bottom end is secured to the fastener 58, while the top loop 135 is supported on the hook 92. The strapping 134 extends helically around the outside of the padding 84 and through loops 130 to hold the cord 128 against the padding 84. The strap 134 is wrapped sufficiently tightly to hold the cord 128 against the padding 84, but not so tightly that the padding is completely crushed.

Because the wall material 100 is longer than the circumference of the enclosure, ends portions 137, 138 of the wall fabric overlap as shown in FIG. 6B. At the top, the end portions 137, 138 are secured by weaving of the line 108 through openings 104 at the top edge of the end portions. A horizontal row of openings at the tops of the two end portions 137, 138 are held with the openings in registry, and

the line 108 [redacted] readed through adjacent openings in the [redacted], in serpentine fashion, so that the top edges of the end portions 137, 138 are in effect sewn together by the top line 108. At the bottom, the outer end portion 138 is secured by weaving of the line 120 through openings 104 at the bottom edge of the end portion. The bottom of the inner end portion 137 is not secured. A piece of 1/2" nylon webbing 139 is woven in serpentine fashion downwardly from the top line 108 through both the end portions 137, 138 to a location 140 between the top and bottom lines 108, 120. This webbing 139 thus sews upper regions of the end portions together. The nylon webbing continues down from the location 140 secured only to the inner end portion 137. Thus the end portions 137, 138 are not sewn together below the location 140, thus providing a flap door 141 which may be bent inwardly to permit access to the chamber 106. A free extension 142 of the webbing 139 can extend from the bottom of the inner end portion 137 to be used for tying down the bottom of the door. In the illustrated embodiment, the extension is secured by wrapping it around the bottom line 120 at the base of the door and then tying it to a removed area of the bottom line 120.

The illustrated enclosure system has walls which are strong but highly resilient. The fabric of the wall 100 is extruded plastic safety fencing which is flexible, but only somewhat elastic. Elasticity is provided by other elements. In particular, the cord 128 is elastic, the padding 84 is comprised of a plastic foam material which compressible and elastic, and the posts 44 are flexible.

When a person jumps from the trampoline surface 40 and hits the wall 100 of the enclosure, the wall moves a short distance in the direction of the force applied by the user and thereby absorbs energy and cushions the shock. All of the posts 44, because they are linked together at the top by the top line 108, flex toward the impacted portion of the wall panel. Cord loops 130 are stretched on those posts 44 which are near the region of impact. And, those loops 130 pull and tension the associated strapping 134 into the padding 84 so that the padding compresses. These actions allow the fence 100 to flex and conform to the body of the person who impacted the fence. The conformance of the fence distributes the resistive force on the person's body to provide enhance cushioning. Also, because of this arrangement

of elements, [redacted]rtion of the impact energy is stored in th[redacted]xed posts 44, in the elongated cords 130, and in the crushed padding 84. This stored energy is promptly released as a force which urges the impacted portion of the wall back towards the center of the chamber 106, pushing the trampoline user with it.

To provide elasticity in this system, the posts 44 should not be rigid. The posts should be sufficiently strong that impacts by trampoline users will not permanently bend the poles. But, the posts 44 should be able to flex to some extent when a trampoline user impacts the wall 100. For ease of construction and low cost, the illustrated posts 44 are made of tubular steel. Other materials, such as pvc plastic, fiberglass and carbon fiber, can be used if they have appropriate strength and flexibility characteristics. As mentioned above, the strapping 134 should not be applied so tightly that it completely crushes the padding 84. And, the padding 84 should be made using a resilient foam. It is a further advantage of this securement system that the elasticity of the loops 130 helps to prevent the wall fabric from ripping.

As most clearly seen in Fig. 7, it is useful to provide cross-bracing straps 144 to limit the movement of adjacent posts toward or away from another. A preferred cross-bracing material is substantially inelastic nylon webbing; plastic or metal cable could also be used. The cross-bracing extends, in pairs of crossing reaches, from positions near the upper end portions 46 of two adjacent posts 44 to positions which are near the elevation of the frame 34, so that an X-shaped pair of straps extend between each pair of adjacent posts 44. The cross-bracing for a pair of adjacent posts 44 can be provided by a single length of strapping which extends in a partial figure-eight pattern among four rings including a top ring 148 and a bottom 149 on each post. The two ends of the strap 144 are secured by a buckle 152.

It is possible to tune the flexibility of various elements of the enclosure system. This can be done by adding or removing one or more sections of flexible cord, or other type of spring, to a run of inelastic strapping. For example, tension springs, such as shock cord segments, could be added to the line 108, the strap 120, the strapping 134, and/or the cross bracing 144. The addition of a short section of flexible cord imparts a small amount of elasticity to such members. For greatest

adjustability, [redacted] a member can be constructed from a se[redacted] of short runs of inelastic webbing, instead of from one continuous run. A tension spring element, such as a shock cord section, can be included in each short run as desired to tune flexibility.

The embodiment shown in Figs. 7 and 8 is similar to the embodiment shown in Figs. 1-6, except that the enclosure system has fewer posts 44. Instead of being mounted on every vertical trampoline leg section 37, one post 44 is mounted on every other vertical leg section 37. This illustrates that the number of posts 44 and where they are mounted will depend on the size of the trampoline and the number of its legs, and the preferences of the trampoline owner. But, using the same basic set of parts, an enclosure kit can be assembled for trampolines of almost every size and shape.

A variety of new games have been developed to make use of the features of the enclosure system of the present invention. These games in some instances employ accessories to the basic enclosure system, as described below.

Tramp Chase. Players start in diagonal quadrants. At least two cords are stretched across a court, and hoops or other obstacles may be attached to them. Someone says go, and the players race around in the same direction, either over or under each of the cords, which the players have determined. Player wins by catching to and tagging his opponent.

Tramp Ball. Players are on either side of the net stretched across the court. Net is placed higher for more challenge. Ball is soft Nerf-type about the same size as a soccer ball. Players throw or hit it over the net. If opponent misses the ball and hits the back most panel of the court a point is scored. Opponent has one bounce of his ball on the trampoline or less to catch ball and throw or hit it back to the other side.

Tramp Shot. Two bungee cords stretched across the court, one high and one low, suspend a target. The target consists of three disks which may rotate. A small, soft, bouncy Nerf-type ball about 4 inches minimum is used. Players may move anywhere in the court. A player serves by hitting the ball at the target, if it misses, the opponent gets a point and the serve.

Tramp Back. Players start anywhere in the court. Target is a large (3' diameter) plastic disk mounted securely against one pole. Ball is small, soft, and bouncy but lightweight, pneumatic-type plastic ball, about 4 inches in diameter. Players may move around in the court. One serve is by hitting or throwing the ball against the target. Opponent has one bounce of the ball against the trampoline to catch the ball, and may only take one step before throwing the ball back at the target.

Tramp Scotch. Many cords are cris-crossed across the court at the same or varying heights. Players must jump over one square to another in a player-determined sequence. For more challenge, players may not touch any of the cords when making the jumps.

Tramp Pass. Two circular targets (3' in diameter) are securely attached to opposing poles in the court. Each is covered with Velcro covered the hook side of

Velcro fastener. A small, soft, medium-weight ball is covered with Velcro loop fastener. A cord along the surface of the tramp separates the two players. Players throw the ball at the opponent's target. The opponent tries to block or catch the ball. A point is scored if the ball sticks to the target. Once the opponent has the ball, he can throw the ball at the other target. For more challenge use more balls.

Tramp Tag. Three to eight balls of varying or equal size and bounciness are used. Players bounce about the court in any direction. They start with 10 balls losing one each time a ball touches them. The last player left with a ball wins. Once a player is out he leaves the court. For more challenge, use elastic cords stretched across the court obstacles.

Tramp Basket. A cord is stretched across the court at below waist height. A small basket with a net is securely attached to one pole. A soft, bouncy Nerf-type ball that can easily pass through the net is used. Players either take turns a predetermined number of times and the one with the most baskets wins or a half-court game can be played. In the half-court game, the player on offense shoots behind the cord. The player on defense may not goal tend.

Tether Tramp I. The ball is suspended from above the court by a bungee cord. A cord also extends from the top cord down to a cord across the bottom. The ball is a medium-sized, bouncy, light-weight, plastic ball. Each player is in one-half of the court as marked by the lower cord, and remains there the entire game. A player wins by hitting the ball until it wraps tightly and completely around the vertical cord suspended in the center of the court.

Tramp Duel. Two nets are securely attached to poles located across from one another. One cord runs across the court at below waist-height, dividing the court into two halves, with the nets at the back of each. The ball is medium-sized and soft. Each player remains in his half during the entire game. Points are scored when a player makes a basket. The defender may block a shot, but may not goal-tend.

High Tramp. A cord is stretched across the net, starting out at waist height. Just like the High Jump, each player attempts to jump over the cord from one side to the other, without touching the cord. Each player gets three attempts to jump each

height. If both succeed, the cord is raised. The player to make the greatest height wins.

Tether Tramp II. Similarly to Tether Tramp I, the ball is attached to a cord which is suspended from an overhead cord. The object is to throw the ball around the horizontal cord. Each player tries to wrap up the ball in opposite directions.

Tramp Touch. A cord is stretched across the court. From it, balls are hung at graduated heights. This allows small children the challenge of jumping up and hitting them at progressively greater heights. They can see if they really did touch or not because the ball will be swinging. For greater challenge with larger kids, hang the balls from the upper part of the TrampBrella poles.

Tramp Throw. Cords are stretched in a grid across the top of the court. Game is played by jumping up through a certain square and throwing the ball down through another specific square.

Tramp Slide Each player attempts to slide one of two soft "buoys" across to the other side of the net. If it hits the other side without the opponent blocking it, the player scores a point. For additional challenge, a cord separating the two buoys for both players can be added. This requires the players to jump over the cord to get between the two buoys.

Tramp Hook. Each player has a different colored set of "hooks." The grid at the top of the court is divided into different sections, and they score by putting their hooks in their color-coded spot for each section. Each player is in a separate section, and they rotate when one completes his section.

Tramp Jump. An ordinary garden hose is attached to a water-pressure driven motor suspended in the center of the court. Attached to the motor is a soft rubber foam rod with a soft-weight at one end. The motor turns the foam rod around the court, and the exiting water splashes around the court. Players avoid the foam rod by jumping or ducking. Its height may be varied.

Speed Ball. Two players have two different colored sets of balls, and a matching colored basket. They race to grab balls of their color (only one may be carried at a time) out of the center basket and put it into their own. Variations can

be played with a center basket, or with players stealing or blocking each others balls.

Jam Ball (one or two players). The enclosure is equipped with two opposed basket ball goals mounted, for example, as shown in FIG. ___. A center line is provided on the trampoline surface at a distance one half way between the goals. A lightweight pneumatic ball is used. Each player defends one goal and shoots for the other. A player with the ball may dribble as in basket ball. To shoot, a player must bounce the ball off the trampoline surface, jump up and catch the bounced ball in midair, and then shoot the ball at the goal before either the player or the ball lands on the surface. To score a point, the player must start the jump from the side of the centerline that is opposite the target goal. For a higher scoring game, it can be established that a player gets an additional bounce, before shooting, after gaining possession of the ball. Goal tending is not permitted. Rebounding determines control of the ball as in basketball.

Having described preferred embodiments of the invention, it is anticipated that suitable modifications and additions may be made thereto within the scope of the invention.

For example, there are alternative methods for securing the top line 108 to the posts 44. As shown in FIG. 8, the line 108 can be wrapped around the neck 90 which will keep the line in place without use of a ring.

The attachment of the wall to the posts could be different. Although not preferred, the wall fabric could be attached to the posts with cable ties. Or, as shown in FIG. 9, the wall could be secured directly to the wall with a helical wrap, without an intermediate cord such as bungee cord 128.

Suitable wall-support posts could be mounted so that they extend upwardly from a trampoline frame, and do not extend to the ground. A bracket for this purpose is shown in FIG. 10. With this system, a trampoline support leg is received in the downwardly-facing opening __, the trampoline frame is received in the horizontally-facing openings __, ___, and the wall support post is received in the upwardly-facing opening __. The bracket can be designed to receive free ends of four separate tubing members as illustrated. Or, a passage way could be provided through the bracket, horizontally and/or vertically, so that the bracket could be secured at a location between the free ends of a tube. For example, if the bracket has a vertical passageway, a single tube could extend through the passageway and, if the tube is sufficiently long, be used for both the trampoline leg and the wall support post. Likewise, if there is a horizontal passageway, the bracket could be secured to a frame segment at a location between the ends of the segment. The bracket shown in FIG. 10 is made of two sheet metal members which bolt together to sandwich tube members therebetween. Other suitable brackets, as shown in FIGs. 11-12, are a metal cross connecters of the type used in plumbing joints.

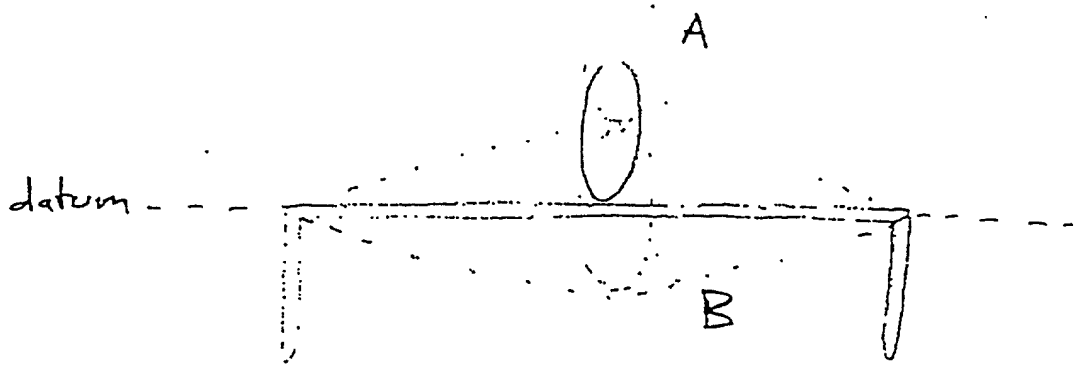
An activity computer could be provided to process data acquired from sensors, of the type shown in FIGS. 13-14, attached to the trampoline and enclosure system. The computer could be linked to a keypad or other user input device. Such a computer would use the inputted information, such as time intervals between

Trampoline Court Specification Sheet

Category	Part Description	Dimensions	Amount	Specifications
Webbing	1" Nylon, Yellow, cut, Type 25 (upper)	45'	1	4500 lb. tensile breaking strength
	1" Polypropylene, Yellow, cut, Type 600 (lower)	45'	1	1100 lb. tensile breaking strength
	1/2" Polypropylene, Red, cut, Type 406	11'	9	375 lb. tensile breaking strength
	1/2" Polypropylene, Red, cut, Type 406	3'	8	375 lb. tensile breaking strength
Shock Cord	1/4" Shock cord	7'	7	180 lb. tensile breaking strength
Steel Tubing 16 ga=.055 min	Upper Support Tube, 1 3/4" O.D., 16 ga., galvanized	3'	8	Cold rolled, 1008-1010 steel
	Lower Support Tube, 1 3/4" O.D., 16 ga., galvanized	6'	8	Cold rolled, 1008-1010 steel
Netting	Co-axial polypropylene fence, 1 1/2" x 2" mesh size	46' x 6'	1	130 lb. tensile breaking strength
Foam Tubing	Expanded polyethylene foam, 5/8" wall, 1.75" I.D.	6'	8	Closed cell, extruded, 2 lb. density
Misc Hardware	Ball End Caps, 90 Durometer, Polyvinyl Chloride (PVC)	2.75" x 2.125" x 1"	8	Made by dipping process
	U-bolt Cover Caps, 90 Durometer, Polyvinyl Chloride (PVC)	3.125" x 2.75" x 1.371"	8	Made by dipping process
	Self-tapping sheet metal screw	#12 x 5/8"	8	
	Eye Bolt, 5/16-18 w/ Zinc, C1018	1.825"	8	
	Tee Nut, 5/16-18 (prongless)	0.375"	8	
	Welded chain link (individual)	1" x 3/8"	12	
	Welded chain link (2 links)	1" x 5/8"	7	
	D-ring	1"	2	560 lb. tensile breaking strength
	Locking buckle	1"	1	360 lb. tensile breaking strength
Clamps/Saddles	Saddle clamp	1.75" I.D.	24	
U-Bolts	Cust. Lower U-Bolt, 5/16"	4.125" X 2.08"	8	
	Cust. Upper U-Bolt, 5/16"	4.375" X 2.37"	8	
Nuts	Nylock Nut, 5/16-18		48	

Energy Absorbtion Factor of Panels: 0.50 to 0.95 (50% to 95% of impact energy is absorbed)
Spring Rate of Support Poles: 5 lb/in to 45 lb/in (a measure of the stiffness of the poles)

RAMPOLINE MECHANICS

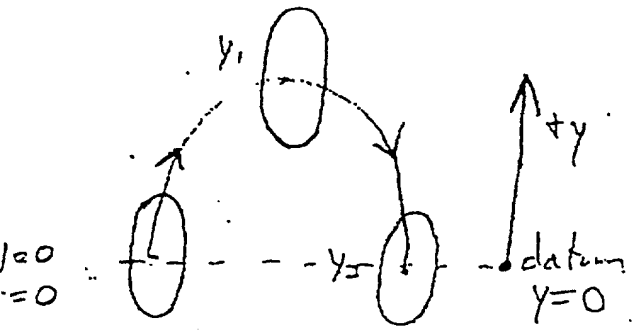


he motion of bouncing on a trampoline is
erned by two distinct phases. Phase A occurs while
ncing up into the air and is described by projectile
ion. Phase B occurs while rebounding on the bed
the trampoline and is described by standing
ve mechanics. The two phases are marked by the
mpoline bed (or the bottom of the user's feet) passing
datum line located at the position of the bed
ile at rest.

he energy added to the system can be calculated by taking
r the difference in the potential energies (height of the
s) or the kinetic energies (velocities while passing the datum)
a bounce and its preceding bounce and adding energy
in damping.

ilabel calories burned is a function of both the
al energy output to the system, and the body's ability
convert nutritional calories into energy.

Part A - Projectile Motion



Assumptions:
- Newtonian mechanics (ie. non-relativistic equations, since velocities are much less than 0.3c)
- Air drag on the body is neglected
- Vertical motion only

Variables:

y = vertical position relative to datum
t = time, starting at t=0 when user's feet travel upward from the datum
V = velocity
t_o = total time in the air
a = acceleration

Constants

g = -32.2 ft/s² or -9.81 m/s² (acceleration of gravity)
c = speed of light

Equations:

$y(t) = y_0 + v t + a t^2$

$y(t) = y_0 + v_0 t + \frac{1}{2} a t^2$

$y(t) = 0 + v_0 t + g t^2$

$y(t) = v_0 t + g t^2$

$v(t) = v_0 + 2gt$

$v_0 = v - 2gt$

at t_1: $v = v_0$

at t_2: $v = -v_0$

at t_1: $v = 0$

$0 = v_0 + 2gt$

$t = \frac{-v_0}{2g}$

$y = v_0\left(\frac{-v_0}{2g}\right) + g\left(\frac{-v_0}{2g}\right)^2$

$y = \frac{-v_0^2}{2g} + \frac{v_0^2}{4g} = \frac{-v_0^2}{4g}$

at t_2: $y = 0$

$gt^2 + v_0 t - y = 0$

$gt^2 + v_0 t + 0 = 0$
$t(gt + v_0) = 0$
$t = 0$ or t ...

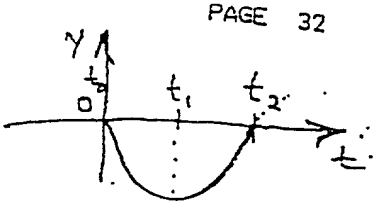
$t = \frac{-v_0 \pm \sqrt{v_0^2 - 4 \cdot g \cdot (-y)}}{2 \cdot g}$

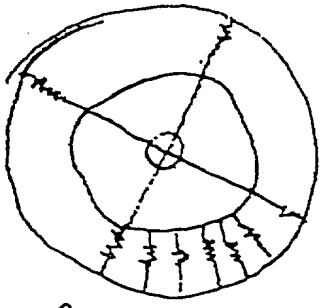
$t = \frac{-v_0 \pm \sqrt{v_0^2}}{2g}$

$t = \frac{-v_0 \pm v_0}{2g} = \frac{-v_0}{g}$ or ~~0~~

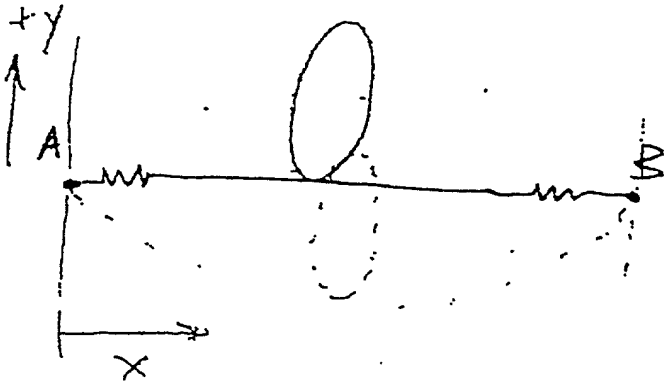
Δt_A: $t_2 - t_1 = \frac{-v_0}{g} - 0 = \frac{-v_0}{g}$

Part B - Standing wave mechanics





(96 springs)



Variables

x: horizontal position
y: vertical position
ω = angular velocity (rad)
f = frequency
T = period
λ = wavelength
μ = mass per unit length
F = vertical force
L = length of string
M = mass of user (m) + mass of bed
$\Delta t_B = t_2 - t_0$

Equations:

$\omega = 2\pi f$

$T = 1/f = 2\pi/\omega$

$v = \lambda f = \lambda/T$

$v = \sqrt{\frac{F}{\mu}}$

$f_n = n\frac{v}{2L} = nf_1 \quad (n = 1, 2, 3 \ldots)$

$f_1 = \frac{1}{2L}\sqrt{\frac{F}{\mu}}$

$t_2 - t_0 = 1/2\,T$

$\Delta t = T/2 = 1/2f$

$f = \frac{1}{2L}\sqrt{\frac{F}{\mu}}$

$\mu = \frac{M}{L}$

$\Delta t = \frac{x}{2}\left(\frac{2L}{1}\sqrt{\frac{M}{FL}}\right)$

$f = \frac{1}{2L}\sqrt{\frac{FL}{M}}$

$\Delta t_B = L\sqrt{\frac{M}{FL}} = \sqrt{\frac{ML^2}{FL}} = \sqrt{\frac{ML}{F}}$

$$\Delta t_{Tot} = \Delta t_A + \Delta t_B$$

$$\Delta t_{Tot} = -\frac{V_o}{g} + \sqrt{\frac{2ML}{F}}$$

$$V_o = g\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot}\right)$$

Kinetic energy $KE = \frac{1}{2} m V_o^2$

Energy added to system $\Delta E = KE_2 - KE_1$

$$\Delta E = \frac{1}{2} m V_{o_2}^2 - \frac{1}{2} m V_{o_1}^2 = \frac{1}{2} m \left(V_{o_2}^2 - V_{o_1}^2\right)$$

$$\Delta E = \frac{1}{2} m \left[\left(g\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_2}\right)\right)^2 - \left(g\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_1}\right)\right)^2\right]$$

$$\Delta E = \frac{1}{2} m g^2 \left[\left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_2}\right)^2 - \left(\sqrt{\frac{2ML}{F}} - \Delta t_{Tot_1}\right)^2\right]$$

Calories Burned

Approx conversion rate for humans $C = 0.20 = 20\%$

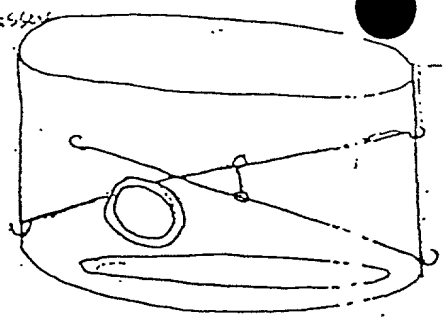
$$\Delta E = (Calories)(C)$$

$$Calories = \frac{\Delta E}{C} = 5 \cdot \Delta E$$

Donald Strasser

Tramp Chase - Donald Strasser

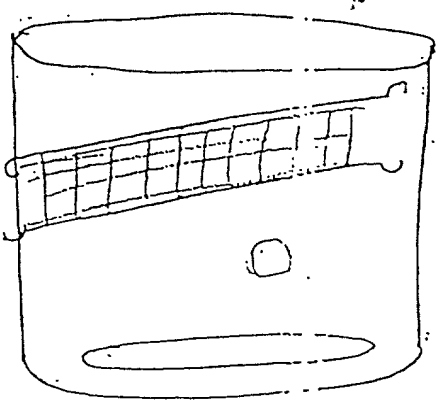
-Players start in diagonal quadrants. At least two cords are stretched across court, and hoops or other obstacles may be attached to them.



-Someone says go; and th players race around in t same direction, either over under each of the cords, whic the players have determine Player wins by catchin to and tagging this oppo

Tramp Ball - Generic

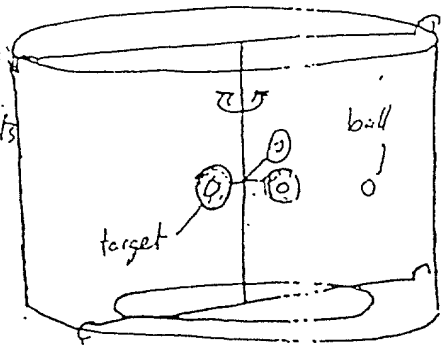
-Players are on either side of net stretched across the court Net is placed higher for more challenge. Ball is soft Nerf-type about the same size as a soccer ball.



Players throw or hit over the net. If opp misses ball and hits back most panel of the a point is scored. Oppon has one bounce of his on the trampoline or less catch ball and throw or it back to the other

Tramp Shot - Donald Strasser

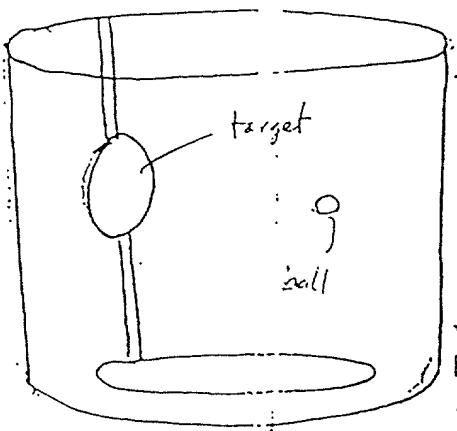
-2 Bungee cords stretched across the court, one high and one low, suspend the "target". Target consists of three disks which may rotate. Small, soft, bouncy Nerf-type ball about 4 in dia is used



-Players may move anywhere in court. serves by hitting t ball at the target, missed the opponent ge point and the serve. ball hits, the opponent 2 or three bounces of ball on the trampoline the ball and throw it to the target

Tramp Back - Donald Strasser

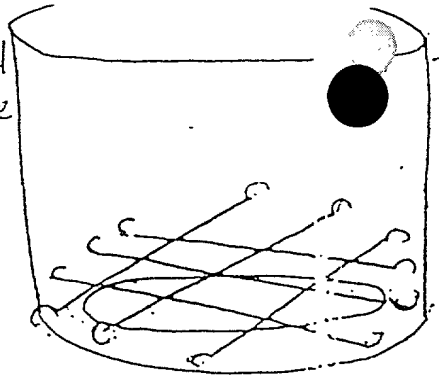
-Players start anywhere in the court. Target is a large (3' dia) plastic disk mounted securely against one pole. Ball is small, soft, and bouncy but lightweight pneumatic-type plastic ball, about 4 in dia.



-Players may move a in the court. One s by hitting or throwi the ball against the Opponent has one of the ball against trampoline to catch ball, and may only one steps before th

Tramp

- Many cords are criss crossed the same across the court or varying heights

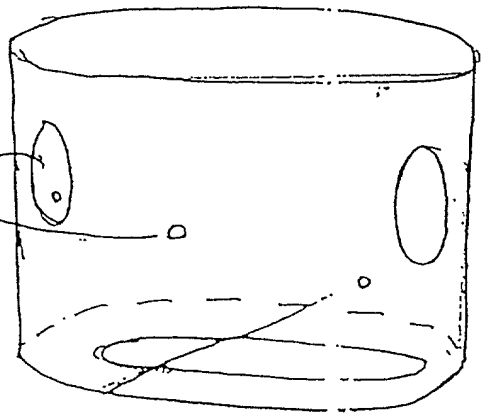


- Players must jump one square to another a player-determined For more challenge, may not touch any cords when making jumps

Tramp Pass

- Mark Publicover

- 2 circular targets, (3' in dia) are securely attached to opposing poles in the court. Each is covered with covered the hook side of Velcro fastener. A small, soft, ~~lightweight~~ medium ball is covered with Velcro loop fastener. A cord along the surface of the tramp separates the two players.

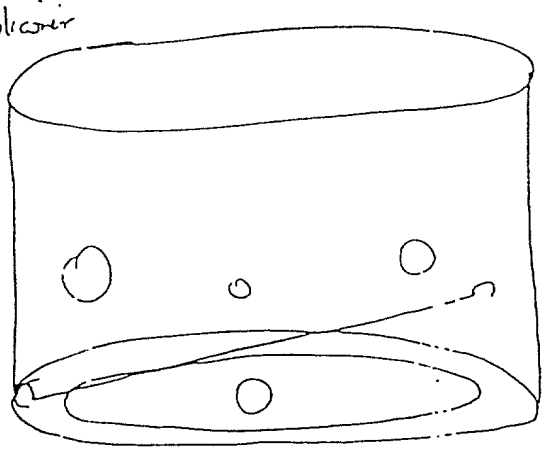


- Players throw the the opponents targe the opponent tries block or catch the point is scored if the sticks to the target, the opponent has the he can throw the ba at the other target more challenge use balls

Tramp Tag

- Jacob Publicover

- 3 to 8 balls of varying or equal size and bounciness are used

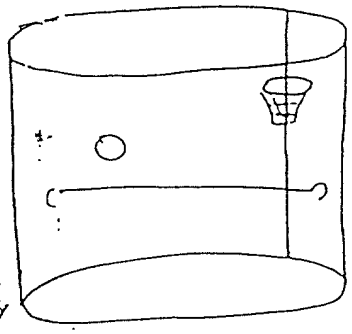


- Players bounce a the court in any dire They start with K losing one each tim a ball touches them last player left with wins. Once a player out he leaves the c more challenge, use streched across the obstacles.

Tramp Basket

- Arnold Strasser

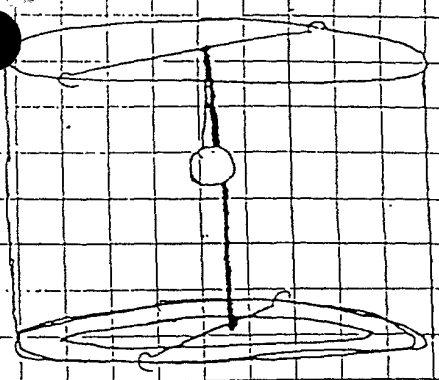
A Cord is streched across the court at below waist height. A small basket with a net is securely attached to one pole. A soft, bouncy nerf type ball that can easilly pass through the net is used



- Players either take turn a predetermined numbe times and the one with most baskets wins, c half court game could In the half court game, player on offense shoot behind the cord. The p on defense may not tend.

Tether Tramp II

- Donald Strasser
- Mark Publicover

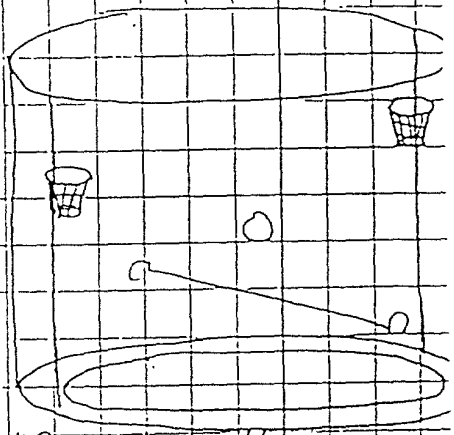


The ball is suspended from above the court by a bungee cord. A cord also extends from the top cord down to a cord across the bottom. The ball is a medium sized, bouncy, light weight plastic ball.

Each player is in one half of the court as ma by the lower cord, and remains there the entire game. A player wins by hitting the ball until it wraps tightly and completely around the vertical cord suspended in the center of the court.

Tramp Duel

- Mark Publicover

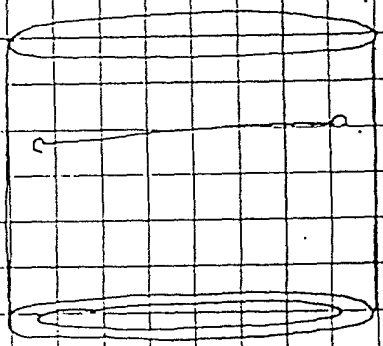


Two nets are securely attached to poles located across from one another. One cord runs across the court at below waist height dividing the court into two halves with the nets at the back of each. The ball is medium sized and soft.

Each player remains in his half during the entire game. Points are scored when a player makes a basket. The defender may block a shot, but may not goal ten

High Tramp

- Donald Strasser

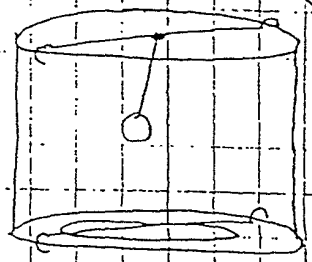


A cord is stretch across the net, starting out at waist height.

Just like the high jump, each player attempts to jump over the cord from one side to the other without touching the cord. Each player gets three attempts to jump each height. If both succeed, the cord is raised. The player to make the greatest height wins.

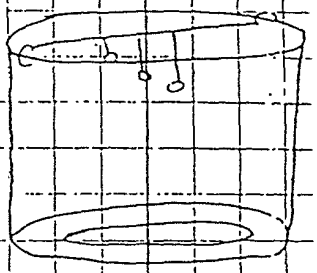
Tether Tramp II - Mark Publicover

Similarly to Tether Tramp I, the ball is attached to a cord which is suspended from an overhead cord. The object is to throw the ball around the horizontal cord. Each player tries to wrap up the ball in opposite directions



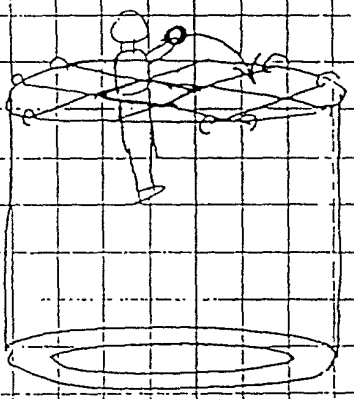
Tramp Touch - Donald Strasser

A cord is stretched across the court. From it, balls are hung at graduated heights. This allows small children the challenge of jumping up at hitting them at progressively greater heights. They can see if they really did touch or not because the ball will be swinging. For greater challenge with larger ta. hang the balls from the upper part of the Trampbrella sole



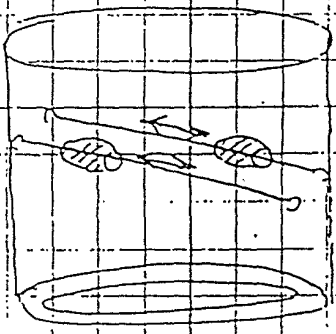
Tramp Throw - Mark Publicover

Cords are stretched in a grid across the top of the court. Game is played by jumping up through a certain square and throwing the ball down through another specific square.



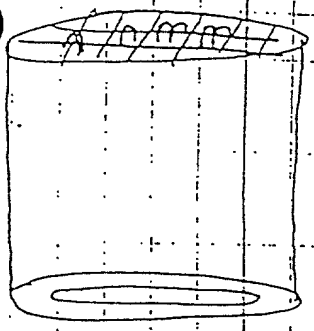
Tramp Slide - Mark Publicover

Each player attempts to slide one of two soft "buoys" across to the other side of the net. If it hits the other side without the opponent blocking it, the player scores a point. For additional challenge, a cord separating the two buoys for both players can be added. This requires the players to jump over the cord to get between the two buoys.



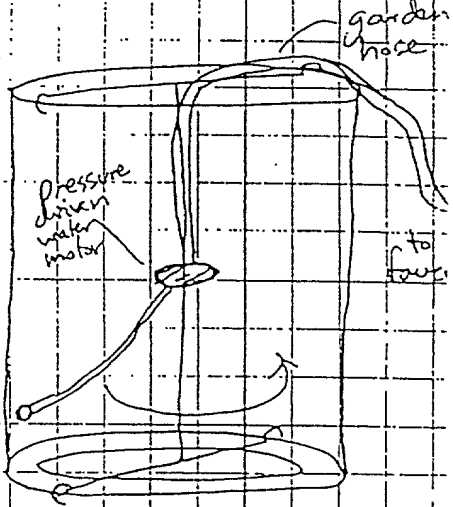
Tramp Hook - Mark Publicover

Each player has a different colored set of "hooks". The grid at the top of the court is divided into different sections, and they score by putting their hooks in their color coded spot for each section. Each player is in a separate section, and they rotate when one completes his section.



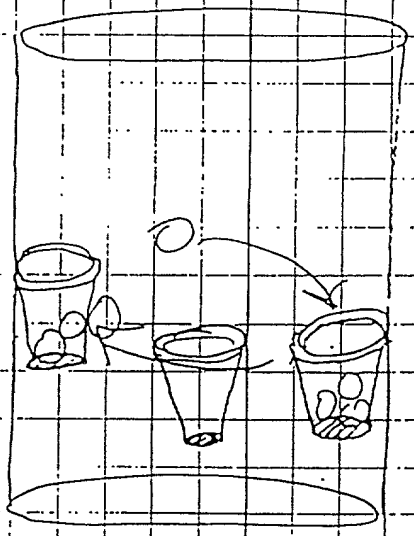
Tramp Jump - Mark Publicover

An ordinary garden hose is attached to a water pressure driven motors suspended in the center of the court. Attached to the motor is a soft rubber foam rod with a soft weight at one end. The motor turns the foam rod around the court, and the exiting water splashes around the court. Players avoid the foam rod by jumping or ducking. Its weight may be varied.



Speed Ball - Mark Publicover

2 Players have 2 different colored sets of balls, and a matching colored basket. They race to grab balls of their color (only one may be carried at a time) out of the center basket and put it into their own. Variations can be played with no center basket, or with players stealing or blocking each others balls.



Entry completed

Donald Strasser

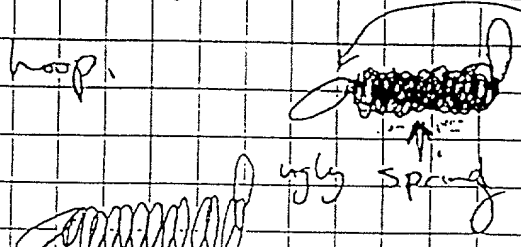
Games (Continued):

Hip Hoop – Conceived of around a month ago, this game calls for one hoop or a number of hoops attached to the participants' hip. The participant bounces on the trampoline, causing a ball to bounce off of the bed.

The participant must jump & move to score the ball through the h

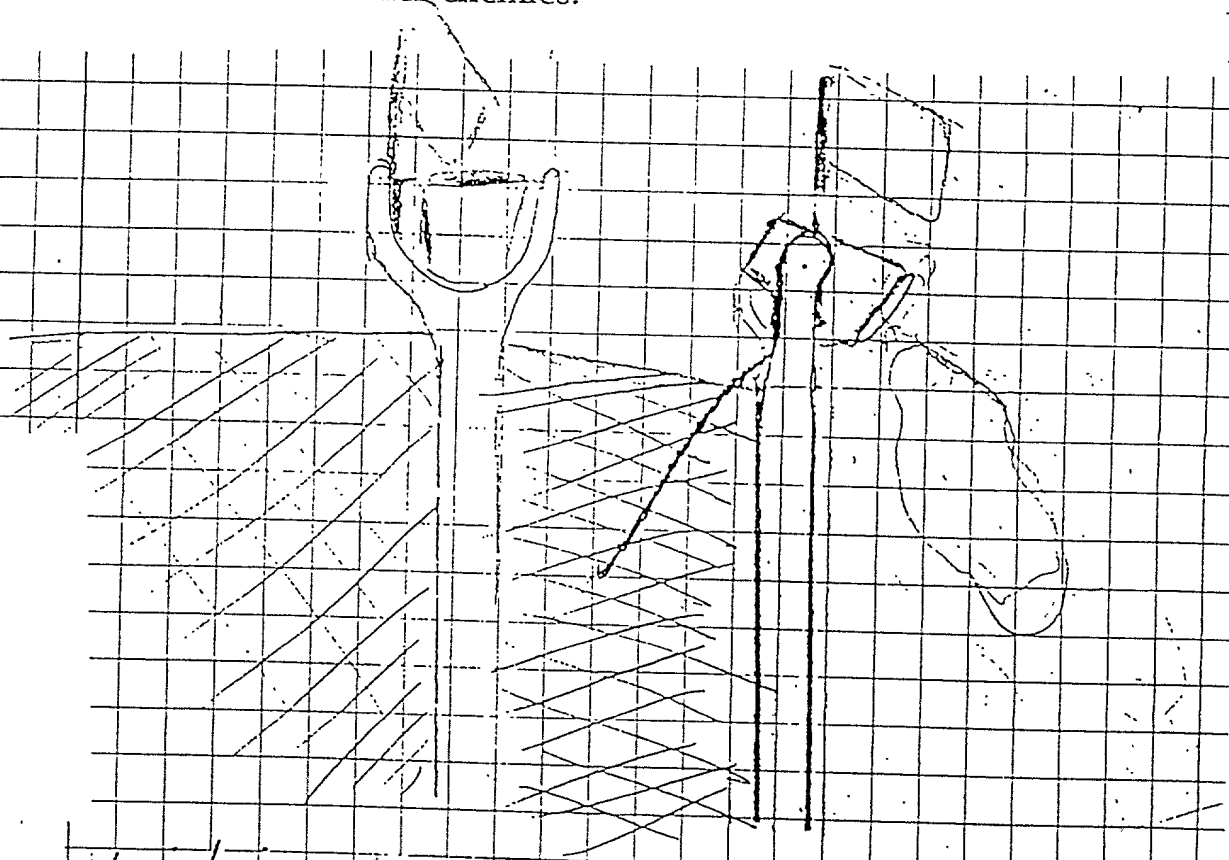
for two players, the hoop / hoops are attached at the waist of the pa try to shoot (using hands) the into their opponent hoop(s).

Name Hoop - A hoop was made out of plastic would be attached to a JumpCart post. The hoop would be durable and be spring loaded so that it will spring back to its standard/normal position after being hit (Spring-loaded breakaway hoop system). Sp would be internal and be run horizontall through the hoop.



#2) Castle Siege

Castle Siege- The player on the trampoline is defending his or her castle from attach. His weapons are buckets on each post (a.k.a. Castle Caldrons) filled with water that he can capsize onto the players outside if they get too close. Participants on the outside are trying to "seige the castle" by knocking the castle flag from where it hangs proudly using bean bags/foam balls. The indivual who captures the castle then becomes King or Queen. The current "King" must block/ capture the beanbags, and if he secures them all, the game ends (and he or she will continue to reign). It takes bravery -but watch out, if the King/Queen hits you with water, you are put into the dungeon until the kingdom falls. One way tool that the "seigers" have are sheilds to defend them from the water. Bungipults (a.k.a flingerthingers) may be used by participants outside, sending in water projectiles (water baloons) or by the King/ Queen to weaken the attacks of his/ her enemies.



Variation(s) Flags are mounted to each post, and the Kingdom is claimed only when all of the flags are knocked down. The flags are velcroed to each flag post so that they may be attached

easily [redacted] after so that only the material falls.

Ramification: In the place of flags, a small bubble pocket made of netting would be the target mounted over each "Castle Cauldron" When each pocket contains a bean bag or Spasl ball, the Kingdom would be successfully conquered.

Design/ Configuration: A small bucket is mounted to each post, (secured on two sides to a "U" that arm that is mounted to the post so that it may pivot). The bucket has a cord secured to the outside portion of the bucket. When pulled the bucket tips outward, ejecting the water contained in it.

Water is feed to the buckets from a single garden hose attached to a [redacted] splitter. Tubes are attached to the splitter

Soakerball (or spongeball)- Players on the outside could dunk foam balls into a water bath, and send it in to the JumpCourt.

Cord Games

Orbital Jump Rope- Rope will either be adjustable in lengths for single/ multiple play, and can be attached to the JumpCourt posts

Bungi cords are attached in a gridlike fashion to the top of the JumpCourt posts. The individuals on the outside have bungi bouncers (with hooks) that they are sending into the the JumpCourt, and gain certain points for entering the different holes.*

Cord tag- A cord is attached to one JumpCourt post, the other side is secured to a cord running perpendicularly which has ends that participants on the outside can pull back in forth. The cord attached to the post can move (and may have a ball attached to it) ; the object of the game is to tag the person on the inside with the cord while he/ she is jumping to avoid it. Once tagged, the players switch.

High HighJump.- Player can adjust the heigth of the obstacle they must jump over.

Mirror, Mirror- Two players play this game at one time, one is the "person," and the other is the "mirror." The tramp Court is divided into quarters (or sixths, or eighths) using jump cords. Every good mirror gives a perfect reflection.... if the person jumps right, so must the mirror; if the person does a one-eighty, so must his or her mirror; if the person pulls a 360 to cord straddle, so must the mirror. This is a game you are actually trying to "break your mirror." Three breaks, and its *your* turn to be the mirror.

One hoop is suspended in the center of a net or a bag attached to it. Players bouncing around on beds try to bounce the ball into the hoop without using their body directly. Hoop is raised for greater challenge.

A variation on this game would be to have players inside defending the goal, while players on the outside make shots. The participant on the outside earns points by successfully putting the ball through the hoop (perhaps only if the player on the inside does not catch the ball before it hits the ground).

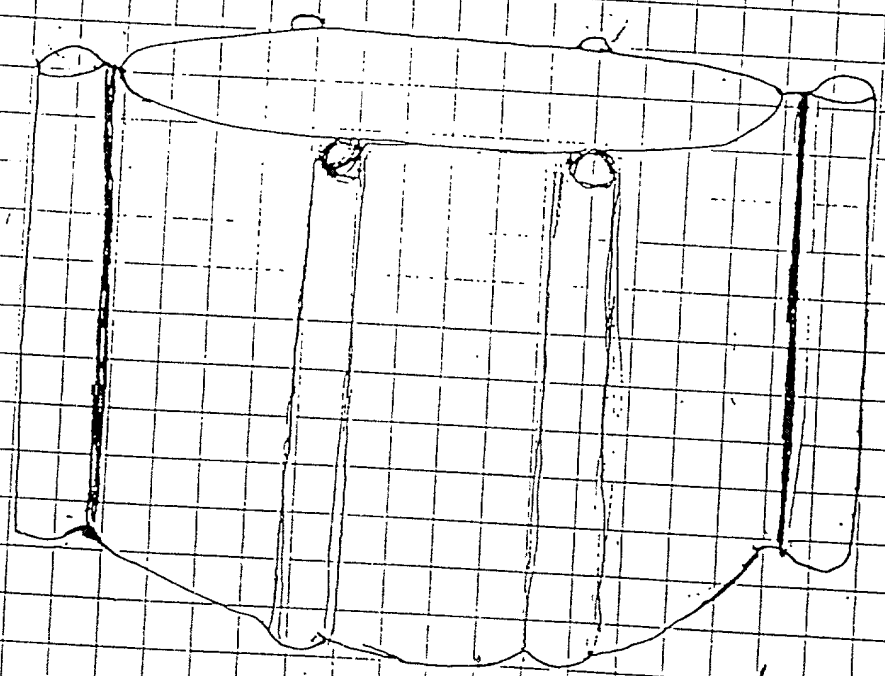
Ball is used with a hoop that is just slightly larger. The net or bag beneath the hoop does not allow the ball completely through. This increases the challenge and the demand for accuracy.

Variation: One player is in the JumpCam and other players are outside with balls (preferably pneumatic). The player on the inside must complete one trip around the world, jumping through each section without touching the cord. After the player makes the trip 'round the world,' he must finish the game by jumping into the hoop. Meanwhile, the players on the outside must shoot a ball into the hoop before the inside player has finished the game.

Reinforcement Post configuration:

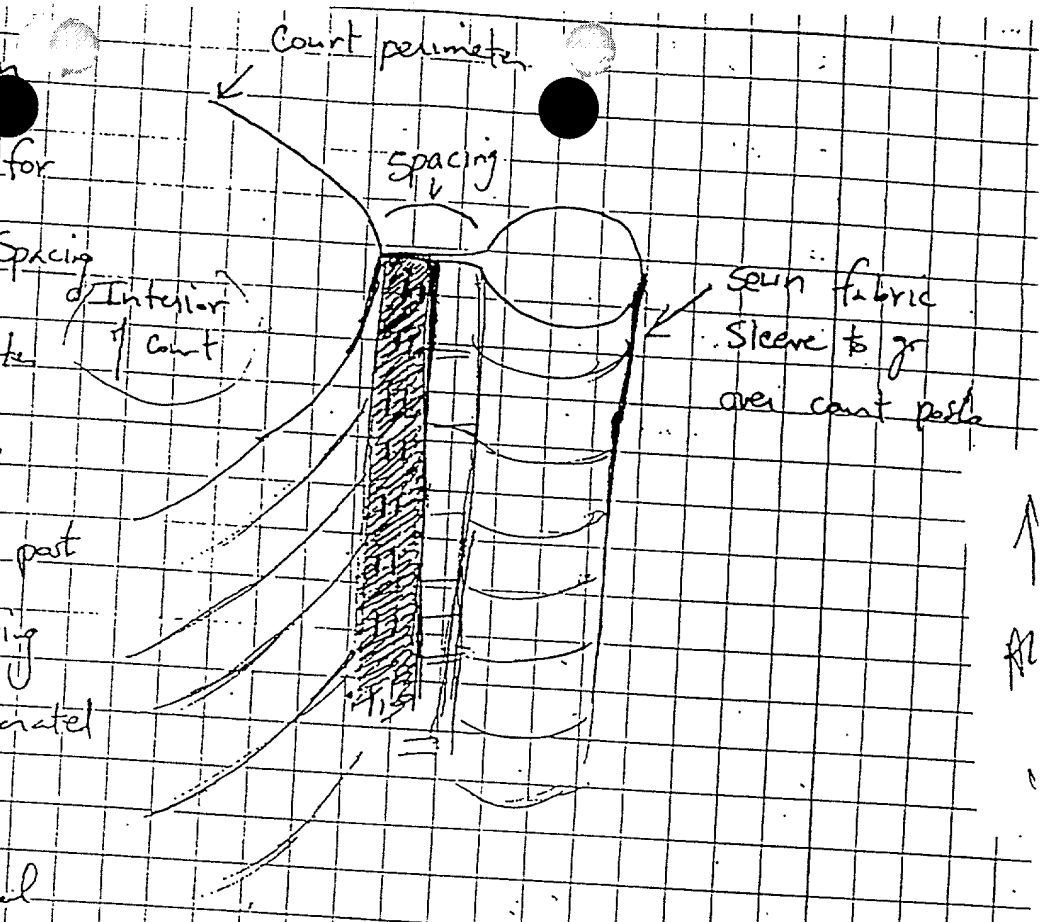
PVC or other flexible tubing could be used in conjunction with steel post, placing the pvc tubing on top of the steel posts, or making every other post alternate between the two same materials. (e.g. steel post/ pvc post/ steel post/ pvc

Unitized design: Softer springs/bed, better padding, ~~ers~~ Safety fence.



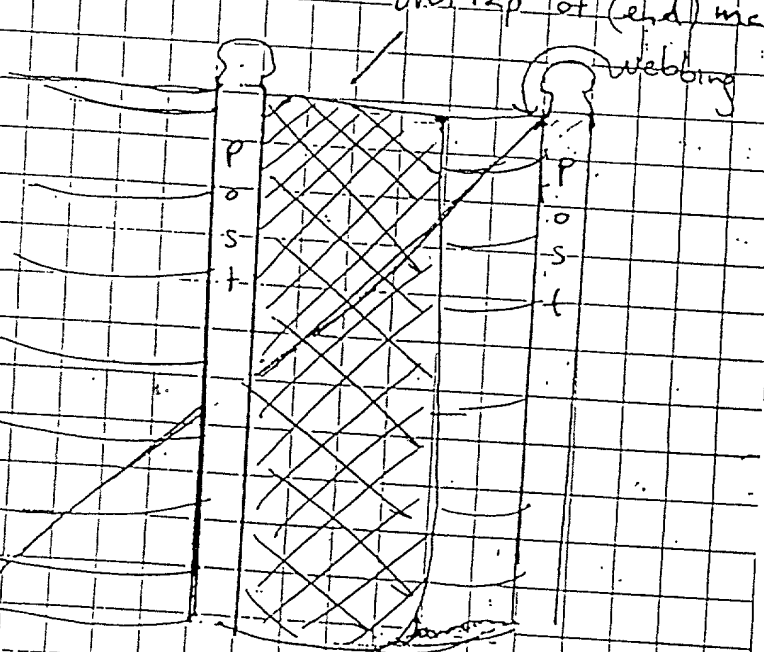
Fence is made out of woven fabric, (polypropdene / polyethylene) nylon polyester folded and ~~stitched~~ sewn down the width (vertically) To be slipped over the posts to anchor it in place.

Webbing is sewn to folded fabric for strength. Fabric spacing exists between court perimeter and post sleeve so that: 1) impact into post is reduced by having inside perimeter separated from posts. 2) court perimeter would equal the perimeter of the trampoline bed so that court could protect individual from the frame and/or springs.



Door Configuration

This arrangement for the door is devised to make access easy but to prevent an individual from falling out even if they don't lock the door closed the way they should.



1) Door overlaps; one end is seamed to post, second end terminates within the first (end)

Jump Tometer

Around [redacted] 15/97 Donald [redacted]rssen built a working prototype of the Jumpometer which we have failed to include until this point. Currently he has added phase #3 to the device, which is a second switch for games using a target and a variety of settings for different elements. Phase #2 was attaching sound capabilities to the device. Currently the device has been tested and has the following qualities/capabilities

- Counts bounces on the trampoline bed, (over the entire bed, and is quite responsive) records them on a digital display
- has a reset button + on/off switch
- has a second switch that records hits on a target
- has switches to select noises and which switches it is monitoring (it can record bounces on the bed + hits on the target simultaneously or independently.
- it will have a countdown or a [redacted] device to trigger a noise on a random bounce/hit.

This device can be used for measuring aerobic + calorie burning activities as well as being utilized in many ways for games.

Securing net/fence to the bed/frame reviewed & ramification discussed.

We have conceived and tested a number ways to secure the netting to the frame or:

1) Cable ties attached to net, and strung thr (punctured) pad, then wrapped rand the frame

(Strapping: elastic or non-elastic)

2) Strapping (webbing) ~~wrapped~~ ~~around~~ woven throug netting and strung through (punctured) pad & wrapped around frame.

3) Cable ties wrapped thro fence, around outside frame and secured to spring

4) Strapping around netting & and frame, without piercing padding

5) grommets attached to padding that strap or cable tie could be strung through, using method #1 & 2 (in place of grommets, clips on page 31 could be employed)

6) grommets attached to padding, cord is strung through it, # ~~wrapped~~ strung through net, and pulled tight (in place of grommets, clips on page 31 could be employed)

7) Same as #six, but cord wrapped around the frame (cord(s))

8) Same as # six, except cord is not wrapped through net. Instead, hooks are used like those on page 30 to secure the net to the frame

9) Hook found on page 32 could be attached to frame, and cable ties/cord/strapping could be secured to it in place of the frame ~~for~~ with utilizing methods 1-8.

10) netting could be secured to movable (inside of the padding or ring) using elastic/non-elastic cord/strapping.

11) netting could be slid under padding and connected to movable bed (padding could be secured to frame or the net)

12) Additional padding could be secured to the frame, using tape or strapping or cord or velcro for protection or in the event that the pad is moved, and secured by method #1-#11. The padding that came with the trampoline could be tied to the frame as normal or (which tends to pop) or attached to the net so that it can move with the impacting body.

13) before hanging the net up, connect the net to the springs by either a) taking each spring off, detaching it putting it through the mesh on the edge (with the bulk of the material above) and re-attaching it or b) taking each spring off, feeding each spring through a mesh on the edge (with the bulk of the material below) and wrapping the bulk of the material around the outside of the frame (taking off each leg and re-inserting it between a mesh) and hanging it to the post.

post / padding / webbing / net configuration

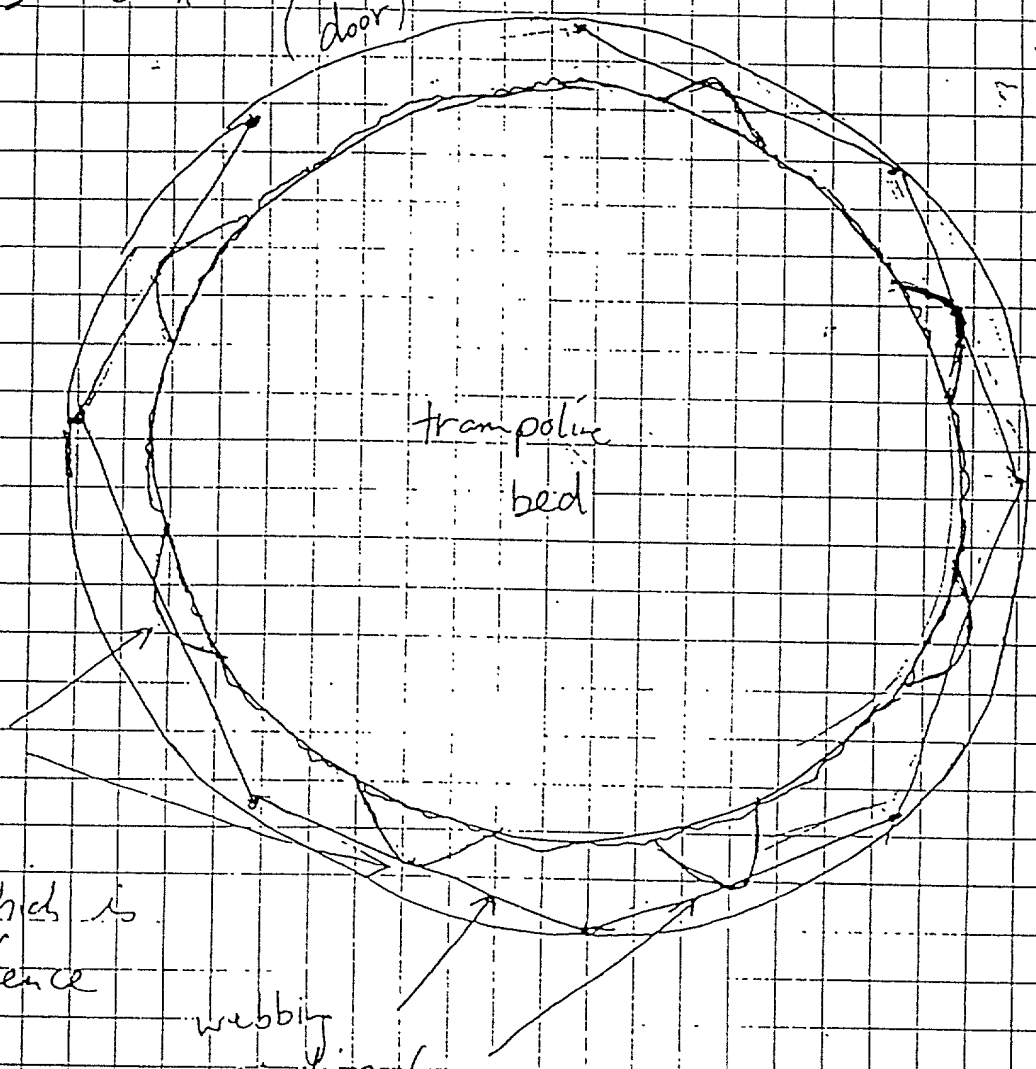
Recap: padding is sleeved over the post, and elastic or non-elastic cord / webbing is wrapped around the post and through the net in a decending, spiral fashion. The padding not only absorbs energy from a direct impact to the post, but also helps to absorb energy from an impact into the net. The webbing / cord, spiralling around the post has more surface area than would cable tie, and therefore helps to distribute weight better. In conjunction with the foam, this attachment of netting to the posts acts to absorb the impact efficiently. The posts, being semi-flexible also work not only to absorb the force of an impact, but also act to rebound the body toward the center of the trampoline.

[illegible] mentioning that the material [illegible] design may be the fence material we are leaning toward in our court design or any type of fabric that will perform well outdoors, like those on page 44).

#14) Securing the bottom edge of the net ramification a ramification alluded to in ramification #6 on page 52 is to have elastic/non-elastic webbing/cord woven through bottom of net, (cuts would probably need to be made in the fence at the posts) and fence drops below the frame of the trampoline and is Sindhell tightly.

#15) elastic/non-elastic cord is woven through bottom edge and secured to the frame of the poster (one end is probably connected to one post, while the other end is tied to the Seventh post. The cord/webbing is pulled tight, for seven sides of an octagon inside of the & the trampoline. Elastic/non elastic cord/webbing

webbing is secur to the web and the trampoline bed in at least one place in between each section.



Ramification to webbing/ cord configuration found on page 6.

Have webbing/ cord woven vertically through net at posts. Using the "candy strip" (spiral) configuration, attach the webbing/cord to the vertical webbing/strapping. This design distributes the weights [illegible] on

5/22

The arrangement could be a variety of combinations

Vertical Weave	Webbing	webbing	bungee	bungee
Spiral Candy Stripe (or "O" ring)	Webbing	bungee	webbing	bungee

↑ ("O" rings could be used in placed of Candy Stripe configuration).

Trampbrella I

Purpose: Same as Trampbrella II

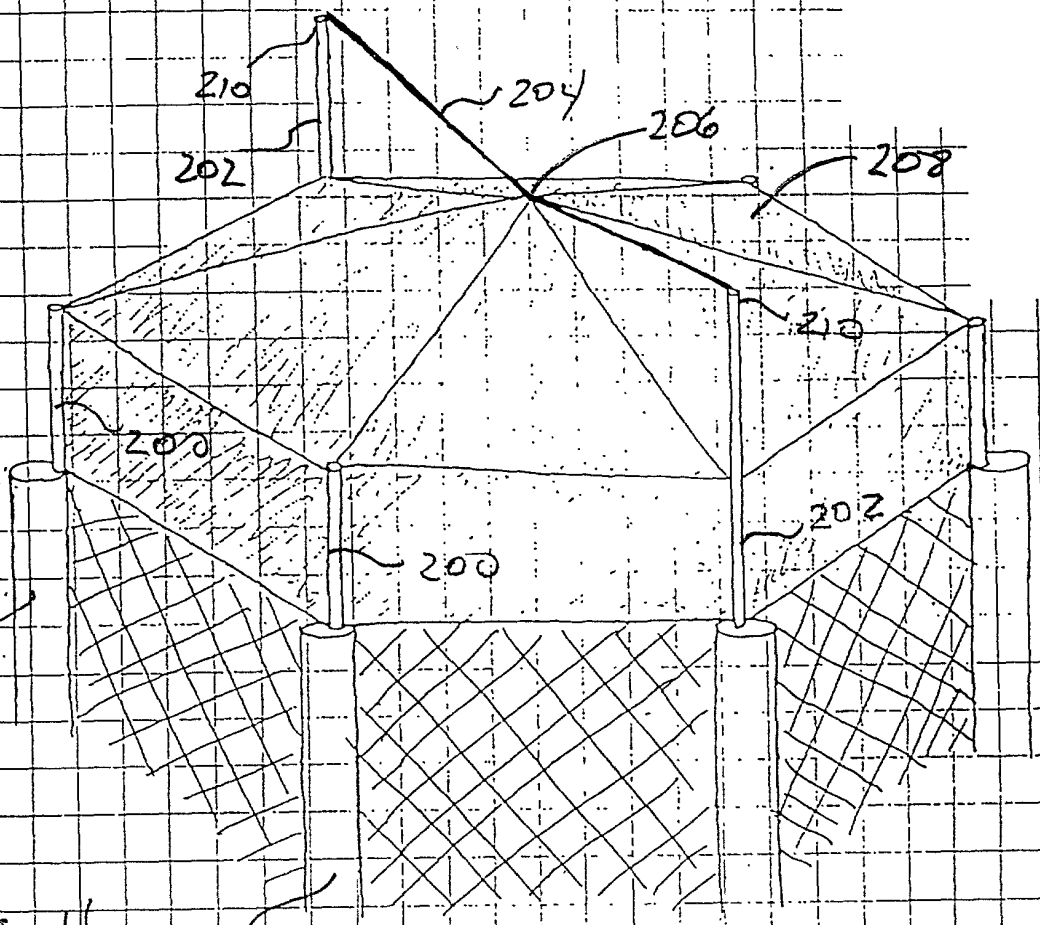


Fig. 11

Description: Short (about 3 ft) poles are attached to all but two of the tramp court support tubes. Two long poles (about 5ft) are attached to the remaining tubes. A line runs between the two tall poles and is attached to the covering. The covering runs down to and is attached to the top of each of the small poles.

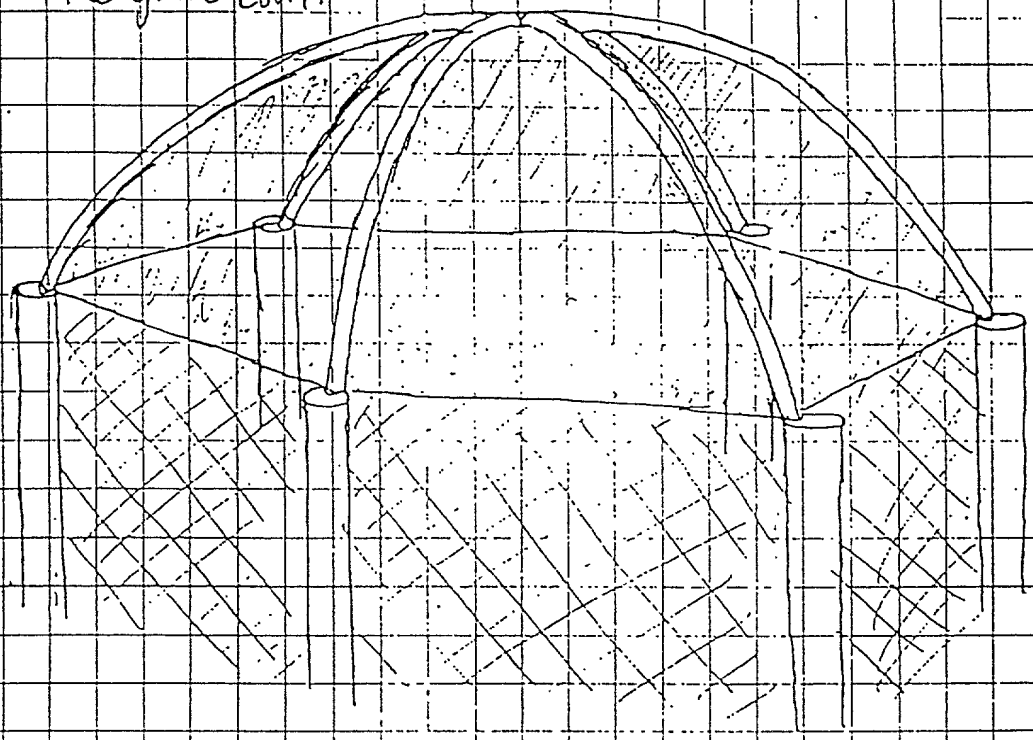
Construction: PVC plastic, or fiberglass for the poles, Netting, Canvas, tent, or awning plastic for the covering

Advantages: The court is completely enclosed. The covering is raised to a height where it doesn't restrict jumping anywhere within the court.

Tramp Brella II

Purpose: To provide shade, shelter, and sun protection over the top of a trampoline equipped with the tramp court. It may also used to attach overhead games, (such as Tramp Touch). It also contains balls, for use with the game court.

Design: Donald Strass
Drawn: Donald Strass



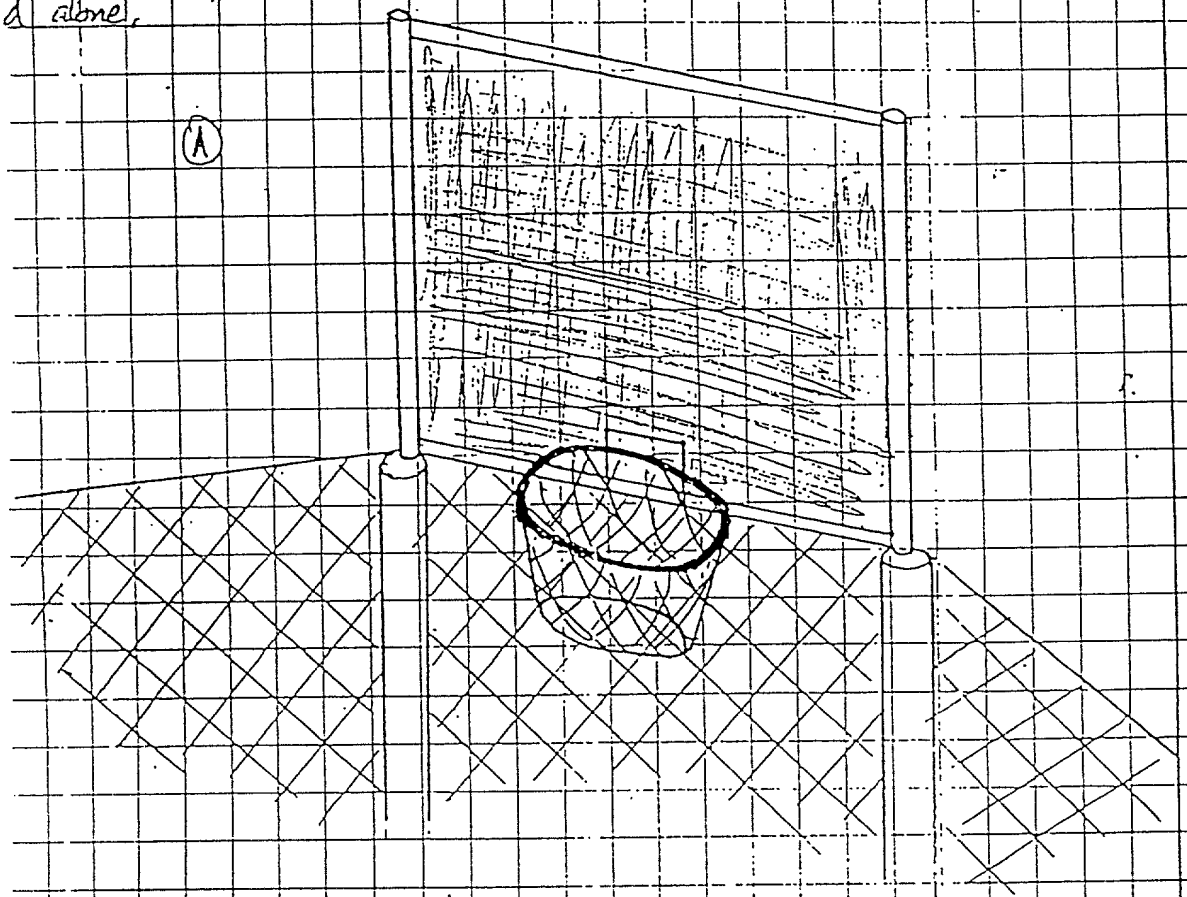
Description: Tent type poles are attached from the top of each vertical support tube and go to either an attachment piece at the center (as shown above) or all the way across to the opposite support tube (overlapping at the center). The design for the 6 support tube model is shown above. A Covering is stretched between the poles.

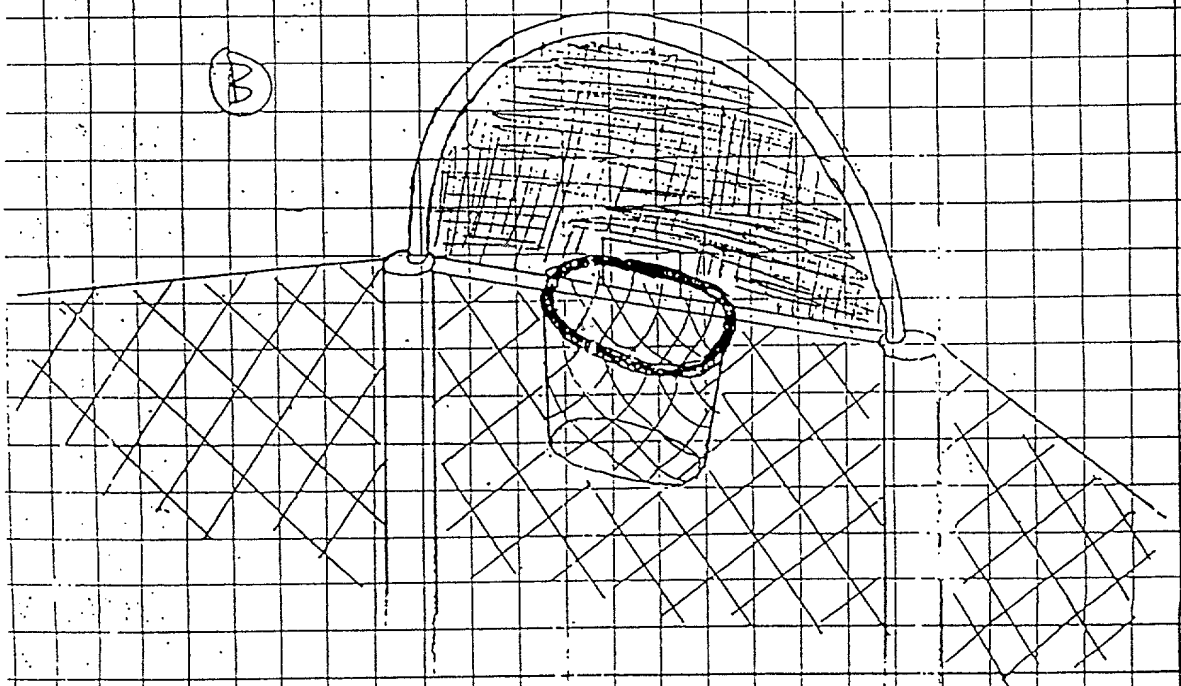
Advantages: Aesthetics - the design is simple, clean, and fits well with the tramp court configuration. Because of the curved supports, maximum overhead clearance is achieved in the center of the trampoline, where it is most needed. The frame is strong enough to support lightweight game attachments

Construction: Either fiberglass or aluminum tent-type poles for the supports, with Netting, canvas, tent plastic, or awning plastic type covering.

The purpose is to provide a backboard and basketball-type hoop and net which attaches to the support poles of the Tramp Court. The backboard is a sturdy, weather resistant plastic or finished wood. Integral, separate type supports are located around the outer edges shown in versions A & B. The hoop can disconnect so that it will not interfere with jumping and so that the backboard can be used alone.

Drawn:
Donald Strasser



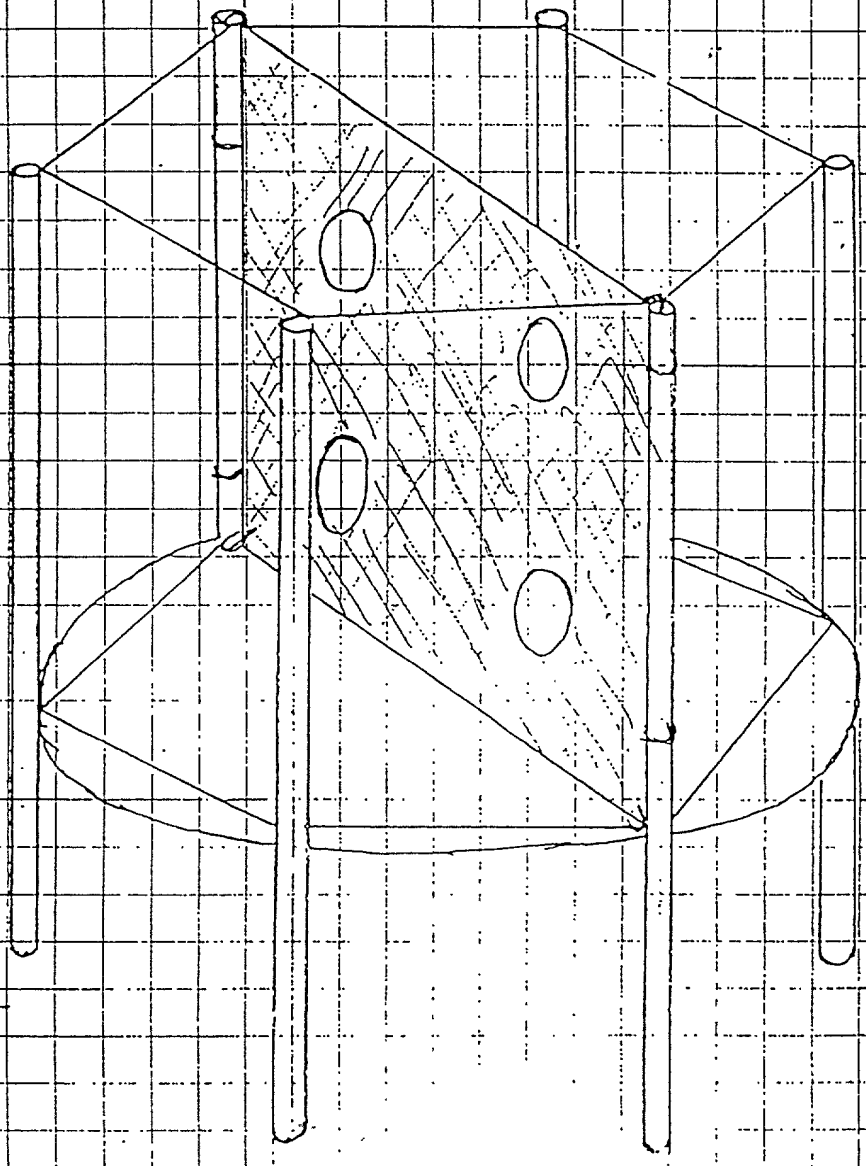


Tramp Court Game Screen

Drawn: Donald Sha

Design: Mark Pub

The Game Screen is an add-on to the Tramp Court system. It attaches to two opposite support tubs and runs across the diameter of the trampoline, dividing the bed area into two "cells." Any number of holes are made in the screen so that a ball of a given size may pass through

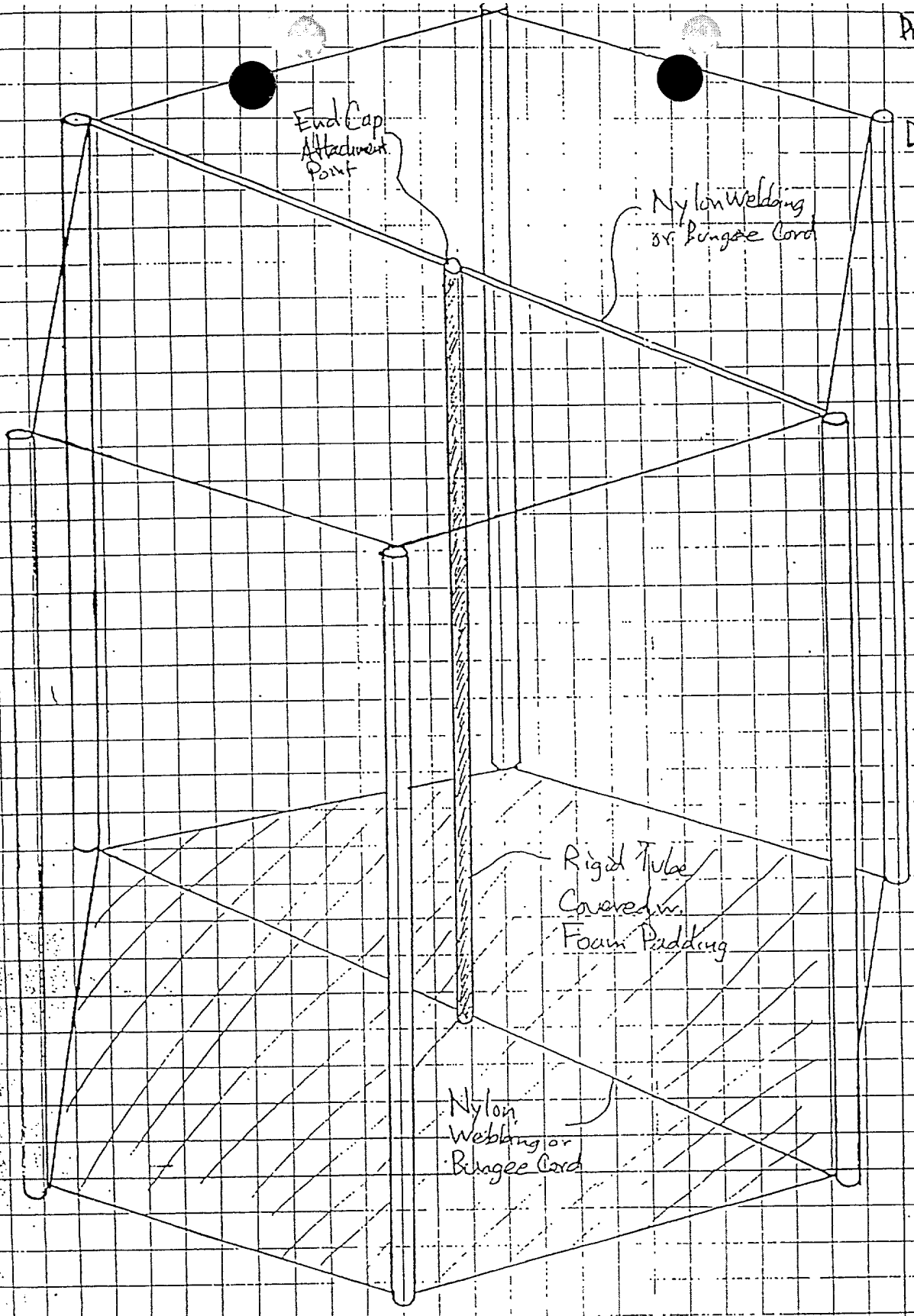


The screen may be made of a mesh, fabric, or plastic sheet and may be transparent, semi-transparent, or opaque. The hooks and bands used to attach it to the poles are either plastic or some type of cord.

Games are played using the screen by passing a ball from one "cell" to another through the holes.

Drawn by:
Donald Stra

Designed:
Mark Public
Donald Stra



Purpose: To provide a mounting point for various games and play equipment

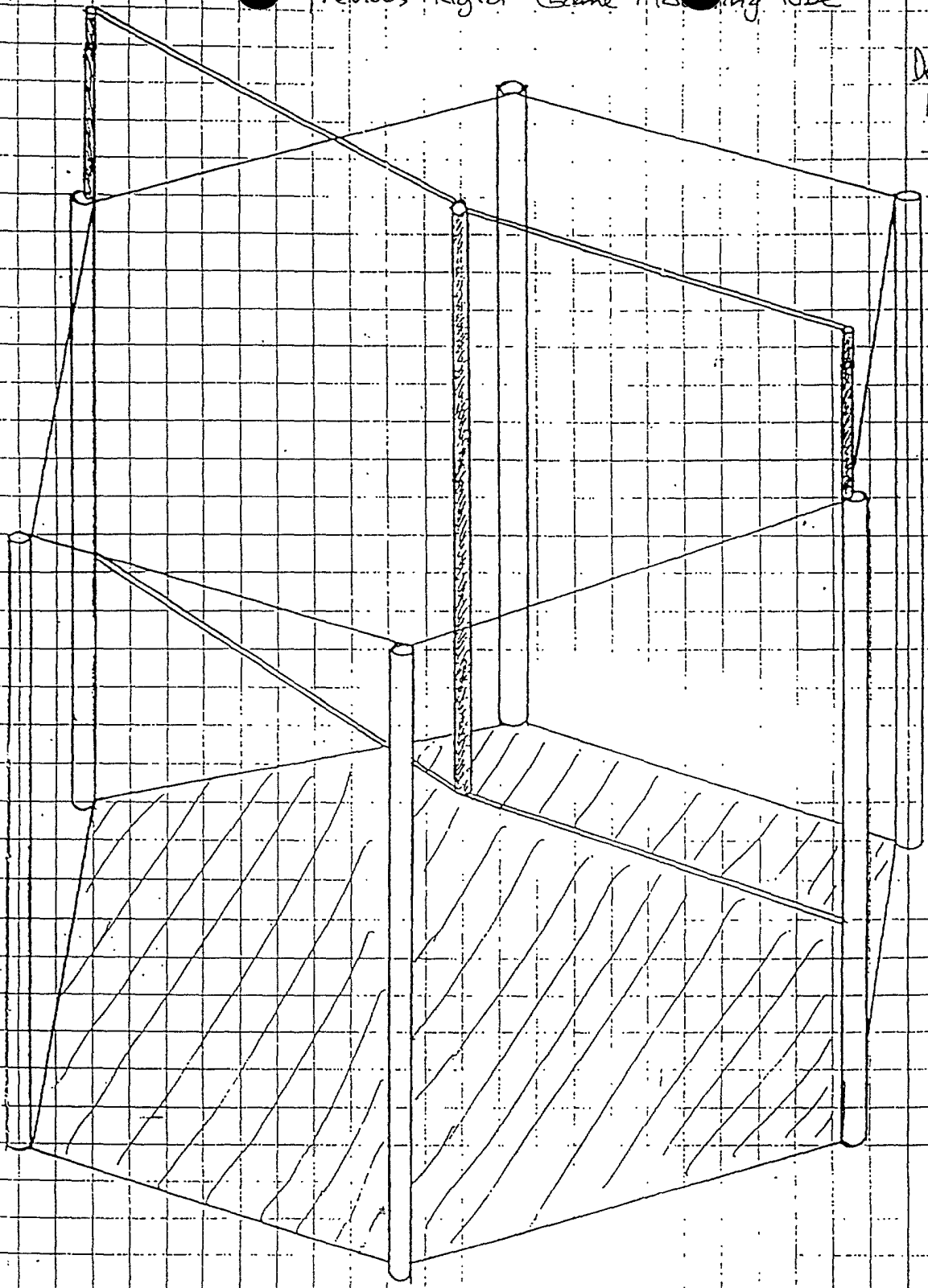
Materials: The tube is a rigid plastic, covered with a foam padding (probably polyethylene). The end cap is plastic (Nylon, HDPE, etc), and the top and bottom straps are either nylon webbing or elastic cord.

Purpose: Same as previous Rigid Game Mounting Tube

Construction: Same as previous Rigid Game Mounting Tube

Drawn by: Donald Strass

Designed: Mark Publico, Donald Strass



Novel Features: Mounting Tube is suspended above the bed surface so that they do not come into contact. This prevents the pole from moving violently up and down when users bounce on the trampoline.

7/9/97

Notes from Mark Publicover For the TrampolineCourt

- The width of the candy-striping straps which wrap around the padding and the poles and engage the bungee cord can increase or decrease the shock absorbing properties of the padding. This is because you are increasing or decreasing the surface area of the strapping. This is one way we can adjust or tune the jump court system to specific weights. You can also do this by using bungee cord with a different diameter to vary the stretch rate. The bungee cord runs from the top of the pole, interlaces the fence, and runs down to the base of the pole. You can also use the bungee cord to actually engage the net and wrap or candy-stripe up the pole, and not use webbing or strapping at all.
- The second thing you can do is to create an enclosure with a more elastic-type configuration. This would be done using netting which is either a diamond shape, or made from nylon cord. Both of these would provide more stretch, giving the enclosure surface better energy absorbing characteristics. This would get rid of the shock absorption afforded by the bungee cord. You could, of course, accommodate the extra elasticity of the nylon cord netting and a diamond pattern, with the bungee cord, and get the same effect by reducing the rigidity of the poles.
- We have considered the different types of poles that could be used. This includes different materials such as graphite-similar to those used in pole vaulting, kevlar, carbon fiber, fiberglass, and different types of plastics. All of these could be incorporated to basically tune the system for different weights and needs.
- There are several different types of bungee cords that may be used. Many different materials may be used for the sheathing, such as nylon, polypropelene, polyester, and other products which could be made to have a high UV resistance and would wear well in the outdoors in a variety of climates.
- The caps at the top of the poles have been designed so that they are rigid enough to prevent somebody from crushing it so that they would run into the tops of the poles. There are several products which could be used for this application. One of the things we could do is to decrease the rigidity and give the homeowner a little tube of foam or some kind of caulking that they would inject into the ball. This could be done either before or after it was installed. We could do that as a second operation or we could actually hand out little balls that could be crushed and pushed in through the neck of the cap. That would add to the ability of the ball to be a little more elastic, and yet still have some mass there to prevent somebody from crushing the cap and hitting the top edge of the pole.
- The caps are currently made of PVC. We can also vary the wall thickness of the cap and go with a 90 durometer and make a thinner wall thickness. We are currently involved in testing whether or not this type of cap would be crushable, yet still stiff enough to prevent somebody impacting the top of the pole from crushing the ball enough to come into contact with the top of the pole. There are hard styrene products

which would also work for this purpose. We are currently researching other materials that would maintain its physical properties over a wide range of temperatures.

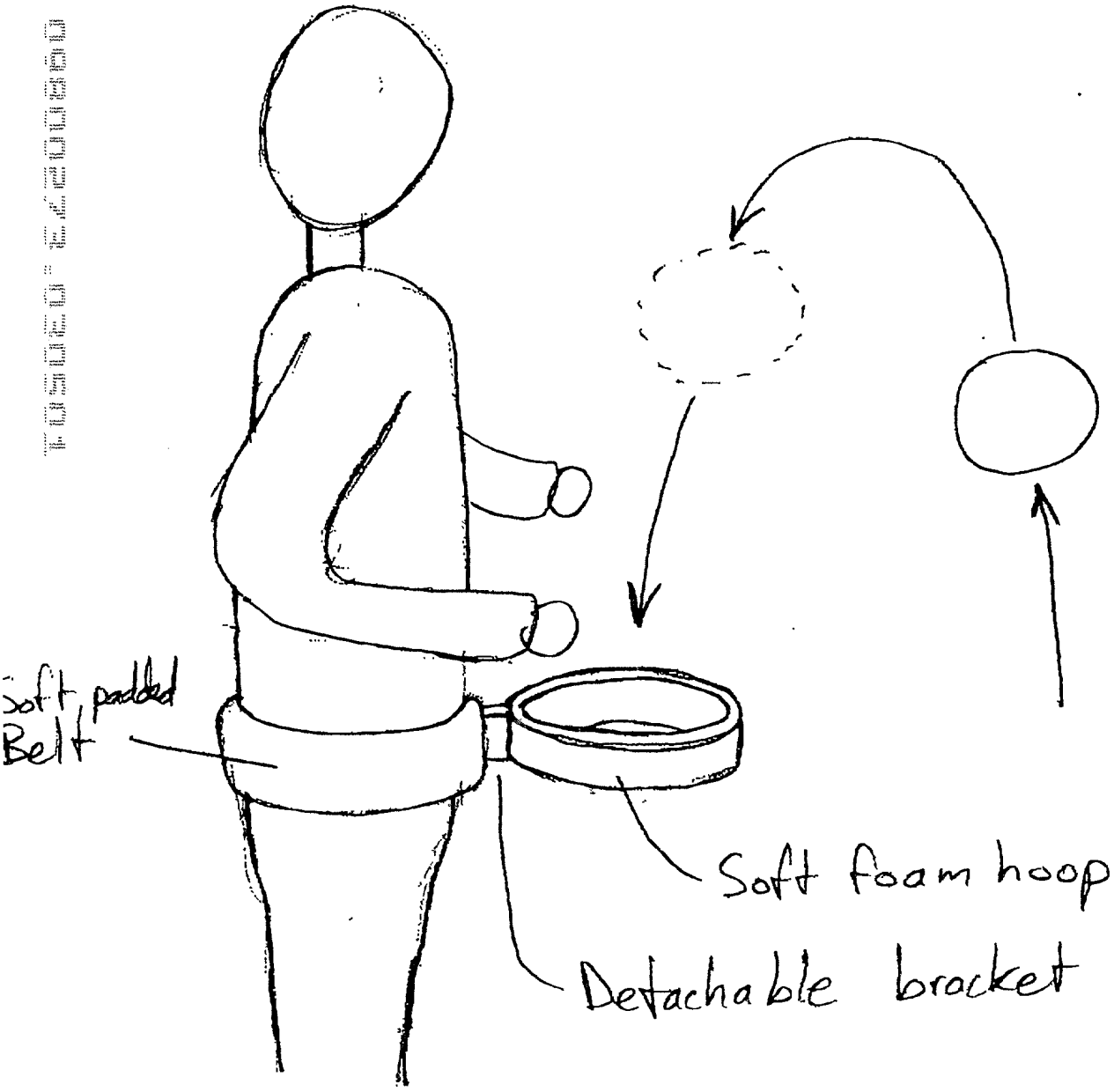
- The shock absorption capability of the system can be varied by the density of the foam padding around the poles. There are other products, such as plastic meshes, that have certain shock absorption properties which could be used to wrap the poles. The strapping could then be wrapped around those products.
- There are a number of ways to create the shock absorbtion capabilities that we are looking for. The most important, of course, is to vary the density of the foam being used.
- We have thought about the fact that we could create screw-type clamp-downs that could be used to hold the legs down, in a situation where you do not want the unit sliding or tipping at all. If there are heavyweight people using the unit, we would want some way of holding the legs down. We can accomplish that by attaching a screw-shaped piece of rod into the ground. This has been done for tents, and so forth. It would have a little round piece at the top that would be able to be adjusted and fit over the leg, or clamped to the leg. We could use a pipe clamp, or several different types of clamps. We could just run the screw shape through that and just clamp it down. Another option is to attach a very stiff bungee cord to the leg or to the trampoline bed and screw the screw into the ground. This would relieve tension and yet still serve the purpose of allowing the thing to tip a little bit, without letting it move. Another option is to put the screws inward, and have the bungee cord coming from the trampoline frame down to the screw. This would allow for some limited movement, and prevent any possibility of tipping over.
- The pads that are used on trampolines cover the circular frames of the trampolines and the springs. We have several improvements to the current designs. The foam should fill the entire sleeve that is sewn for the pads. Right now, the foam that manufacturers put in the sleeve is only 8" wide, whereas the sleeve itself is 12" wide. This creates 4" of slop in there, and where the pad can slip in toward the center of the trampoline. This exposes the circular frame of the trampoline. To prevent this from happening, we can use foam which is cut to fit snugly into the sleeve so that there is no room for movement. Secondly, we can use tubular foam padding to go around the circular frame of the trampoline. Most trampoline frames have an outer diameter of 1.92". We can use tubing with an inner diameter larger than that, such as a 3" inner diameter, and split them in half. These can be packaged with PVC tape, which is very weather resistant. This will be color coordinated to match the TrampolineCourt. The foam tubing can be attached to the circular frame of the trampoline by wrapping it with the PVC tape. This idea could be important in marketing our products, allowing the customer to have a safer, or "soft" trampoline.
- Another area for improvement in pad design is the problem of keeping pads in place. We can have each manufacturer make a pad that has holes punched in it, in the area where our court attaches to the legs. This would allow the pads to be pulled down in its proper position. The U-bolts would then be slipped through the holes in the pad skirt. The holes would be punched, and the area around them would be reinforced, so that it was quite strong, and then it would slip down quite nicely over the U-bolts. Then our trampoline pad would be attached to that. Another way to reinforce that area is to stitch in a bungee cord to attach the pad to the trampoline frame. Right now most

manufacturers stitch nylon webbing to the underside of the pads and have the user tie them around the trampoline frame. The problem with this is that these ties are immovable. When someone lands on the pad hard enough, the pad is pulled inward, away from the frame, and the webbing begins to rip away from the pad. This is a very common problem. Our design is to use an elastic system to attach the pad to the trampoline frame, thereby allowing the pad to move when it is hit, and preventing the attachment points from being ripped away. (Jumpking currently makes a pad with elastic attachment straps which are fastened by a nylon buckle)

- Another improvement to the pad is to use a PVC coating. This would be more expensive, but would hold up at least 3 times as long as the material that they are currently using. We could also use HDPE, or various roofing material such as Duralast as a colorized cover fabric for the padding. Because of its tremendous durability, it would hold up at least 3 times as long as the current materials. An additional idea is to create a cover without padding that we would sell to cover the manufacturer's padding. This would be made out of PVC, HDPE, or Duralast. It would be attached by bungee cords in a Z-type pattern running underneath the frame and springs of the trampoline. You would stitch an attachment point along one side of the cover, and lace underneath the trampoline from the spring-bed connection to the other side, where you would have another connection, and then back and forth around the trampoline. You could have a cord attachment that would run along the outer edge of the trampoline, and pulls together like a draw-string. Then there is an elastic inner connection that runs from the inner edge of the cover to the bed rings of the trampoline. Then you would have a simple cover, without padding, which would prevent deterioration of the manufacturer's pad. This would not have the additional cost of stitching in padding, and all that it entails.

Hip Hoop

Description - game is played with the "hip hoop" device, and one or more balls. User bounces on surface of trampoline, while attempting to control the bounce of the ball. The goal of the game is to bounce the ball through the hoop.



Water Jump Rope

Description - Unit sprays moving streams of water across trampoline. User attempts to jump over or duck under spray to avoid getting wet. Motion of the spray is operated by the water pressure from the hose.

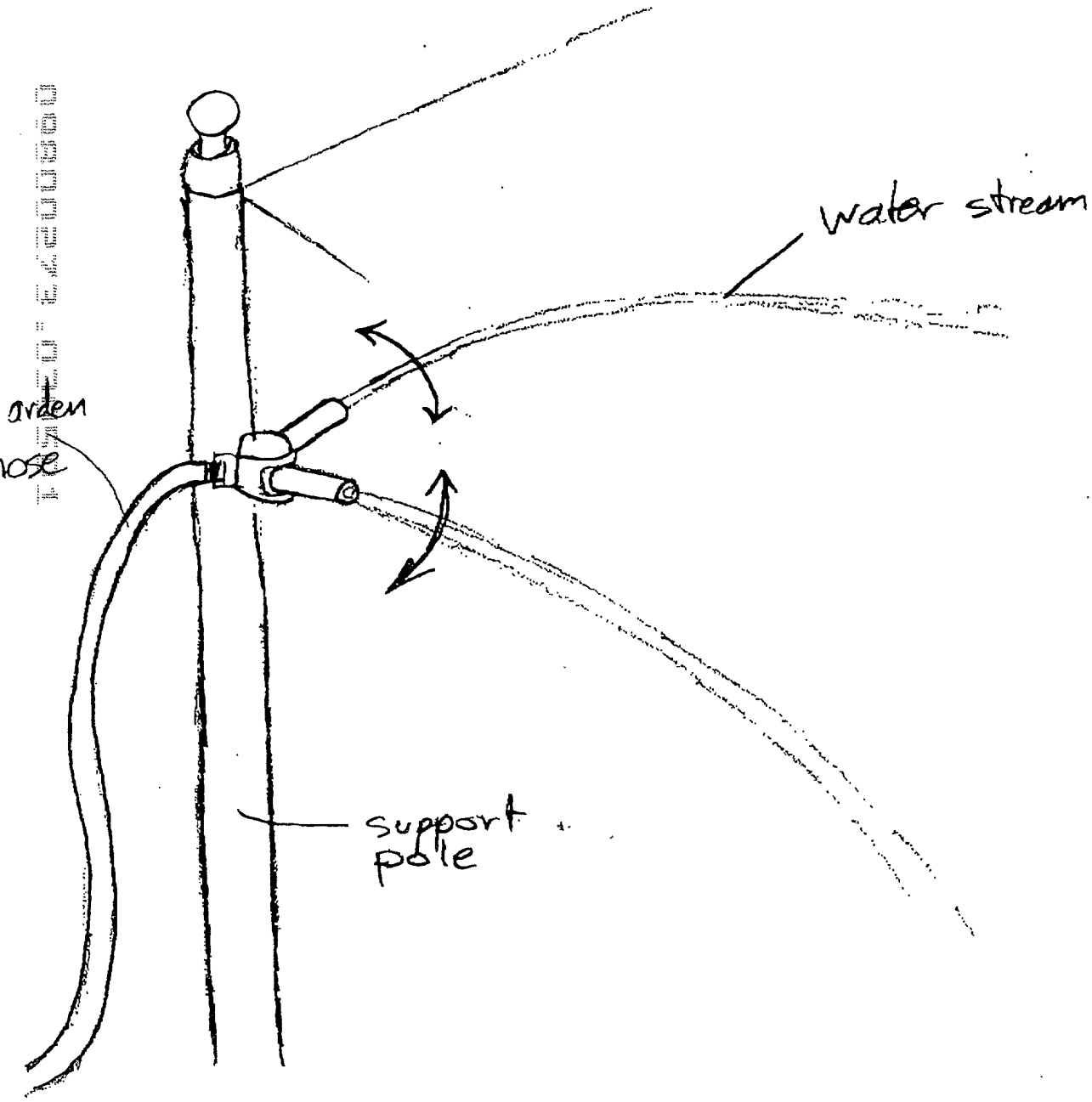


FIG. 1

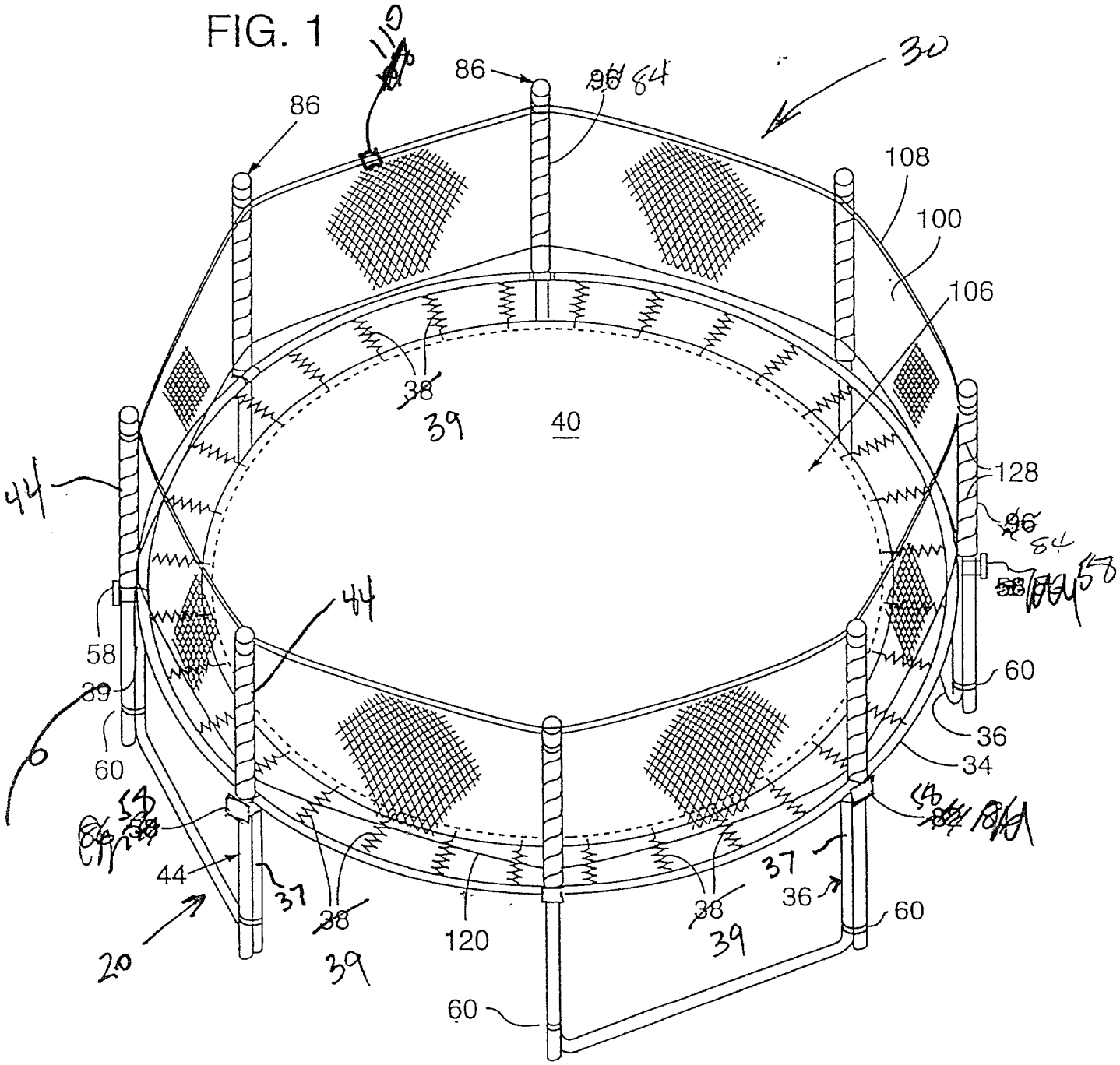

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FIG. 2

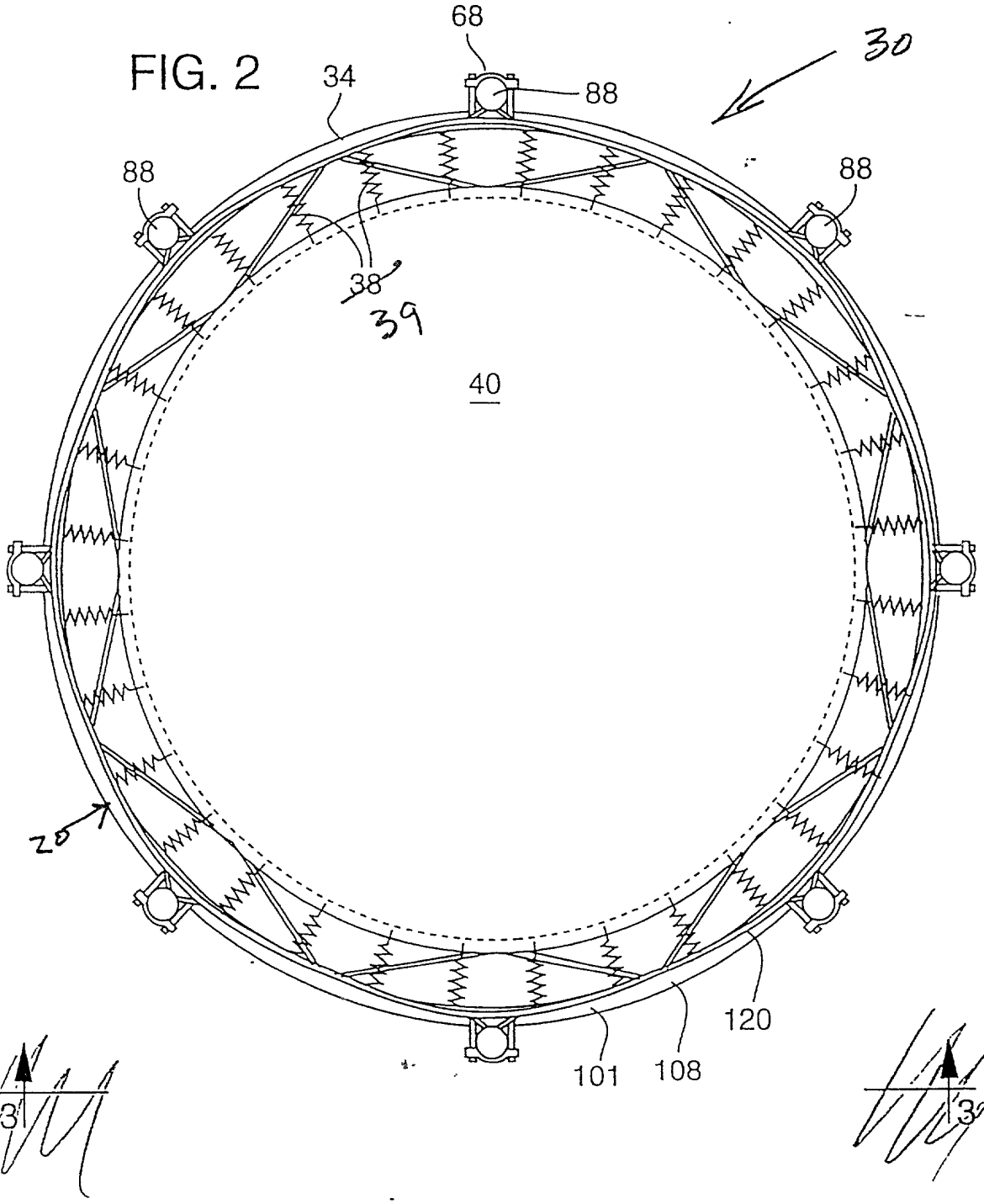
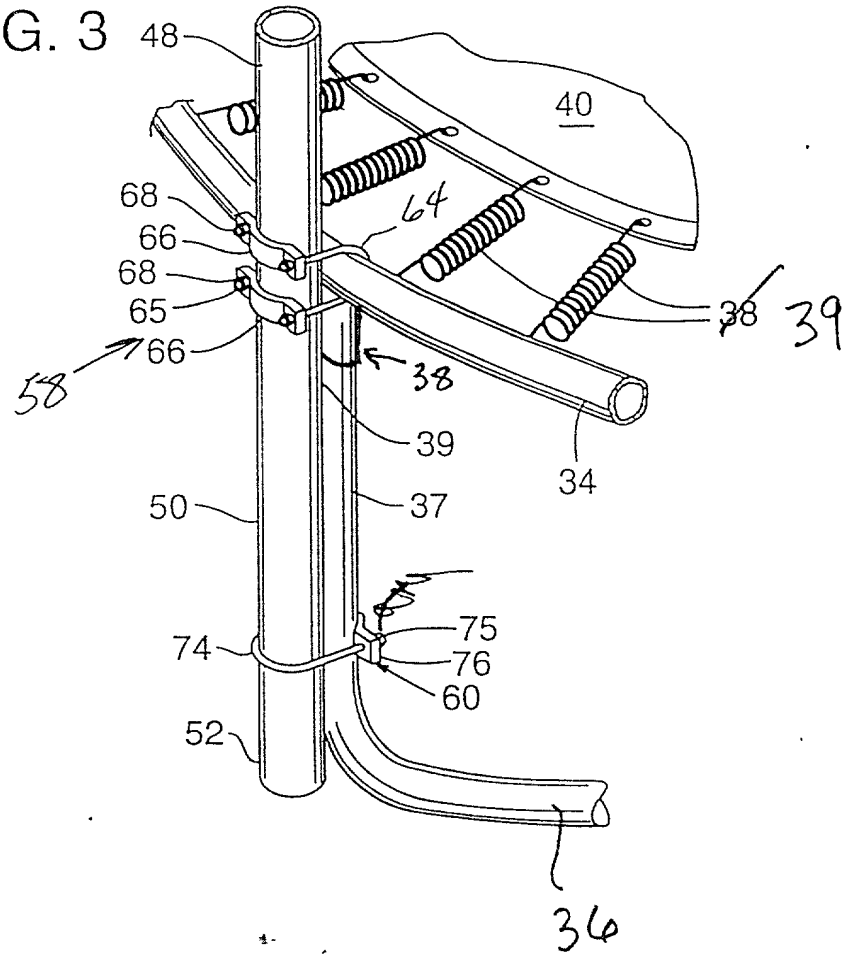


FIG. 3



(38 is swage joint)

PACKAGING ARRANGEMENT FOR TRAMPOLINE/POOL ACCESSORY

My copending applications 60/052,052 and 60/050,324 (attached as Appendixes A and B) disclose a safety fence accessory for use with trampolines. Also disclosed are various games that employ the safety fence as a structural support.

The same fencing concepts can be employed with above-ground pools as well. For example, the upright poles of my safety fence can be secured to first and second straps positioned around top and bottom edges, respectively, of an above-ground pool. A third strap can link the top of the poles (e.g. six feet above the top edge of the pool). A fence structure like that disclosed in the cited applications can be mounted to the poles. Such a fence can serve diverse purposes, including preventing balls and other pool toys from leaving the pool area, and restricting access to the pool. Watersport game accessories can likewise be mounted to the poles and fencing, as further detailed in the cited applications.

U.S. Patent 5,399,132 discloses another trampoline fence arrangement, employing PVC or metal pole frameworks to suspend fencing material. The patented system contemplates poles of uniform diameter, and is illustrated with reference to continuous, rather than joined poles. A drawback of this arrangement arises in shipping. If the poles are single-piece, the package is necessarily quite large -- perhaps eight feet long. If the poles are multiple-piece, the package girth is increased, to accommodate the plural pieces needed for each support framework. Costs of shipping are related to carton size, making the patented system relatively expensive to ship.

In accordance with a preferred embodiment of the present invention, such drawbacks are overcome and additional advantages are provided. The support poles of my safety fences are formed of plural nesting poles. For example, a first pole is two feet long, and has an outer diameter of 1.75 inches. A second pole is six feet long, and has an outer diameter of 1.5 inches. For shipping, the first pole is coaxially positioned over the second pole, resulting in a net length of just six feet. Moreover, the first pole has a dimple on its end (an artifact of the tube cutting process) that reduces its inside diameter to less than the 1.5 inch outer diameter of the second pole. This prevents the first pole from sliding along the second; instead, it is constrained to a

position at the end of the second pole. This arrested movement overcomes a drawback in some other nested-tube arrangements, in which sliding of shorter tubes is possible, with the possible consequence of inertial damage to the shipping carton (e.g. blowing out an end of the carton).

In the preferred embodiment, the nested pole arrangement is slid into a surrounding foam tube, having an opening of about 1.75 inches in diameter. This further constrains any movement of the first pole (due to the close fit within the foam tube). It also protects a painted finish on the poles. The foam tube helps fill air space in the carton, improving the carton's crush-resistance (e.g. when stacked). The foam also protects other contents of the carton (e.g. an instructional videotape) from damage due to encounters with the poles. (The videotape instructs the user in assembly of the safety fence, thereby saving telephone support costs.)

Sectional views of a shipping carton, including plural nested poles together with fence netting, caps, video, etc., and showing shapes of associated foam (styrofoam) inserts, is shown in Appendix C.

Similar packaging arrangements can advantageously be employed for shipment of tubes for other recreational equipment, such as outdoor play structures (swingsets, etc.).

In many embodiments, the poles are metal. But this need not be the case. PVC is one option. More preferable than PVC in most instances is fiberglass. The particular material can be selected to tailor the flexibility, elasticity, and strength of the resultant system as desired. One embodiment employs a fiberglass second (upper) pole with a steel first (lower) pole. Another embodiment employs a heavier gauge stronger steel first (lower) pole, in conjunction with a lighter, more elastic steep second (upper) pole.

Varying the overlap between poles, and well as varying height of the pole and/or overlap off the ground, allows the system to be adjusted for different demands. For example, enlarging the overlap region, or extending it further above the trampoline, stiffens and strengthen the system for heavier or taller individuals; whereas mounting the overlapping region below the trampoline frame adds flexibility for lighter individuals.

Telescopic fitting of poles facilitates adaptation of a single fence kit to differently sized trampolines or pools. For example, 10 foot diameter trampolines are typically 20-24 inches high,

whereas 14 foot diameter trampolines are typically 33-36 inches high. End user customization of the safety fence is required, if a single model of fence is to be employed with both sizes of trampolines. A fixed length tube (whether of constant diameter, or tapered as by swage joints) requires the customer to cut off an end of the pole to adjust the height. The present telescopic (slip fit) joint permits the customer to customize the pole height by simply by coupling the tubes (whether by a screw, bolt, compression straps, etc.) to achieve the desired length. Excess length is not discarded, but rather fortifies the overlap and the strength of the resulting structure.

Additional details on my safety fence, improvements thereto, and packing/accessories therefor, is provided in the attached Appendix C.

To BILL CORNWELL	[illegible]
Co./Dept.	Co. JUMPSPORT
Phone # 503 226 7391	Phone # 408 866 3120
Fax # 503 226 9446	Fax # 408 866 3124

Extruded netting:

The nodes and strands were specifically designed to be rounded/oval, and have smooth transitions to significantly reduce likelihood of cuts/abrasions to users or the pole foam upon impact. This is the first time a mono filament, extruded, unwoven polypropylene product has been used in this application. Among the many products we tested, this was the only unwoven extruded product to pass our impact testing without zippering. As result of our proprietary cutting tool design, this is the first time a product like this has been cut longitudinally in production to yield a smooth clean edge.

Slip fit Pole design offers several advantages:

The materials used for the upper and lower pole sections may be varied to adjust the flexibility, elasticity, and strength of the system. For instance, a fiberglass upper with a steel lower, or a heavier gauge stronger steel lower combined with a lighter more elastic steel upper. Varying the overlap as well as varying height of the Pole off ground allows the system to be adjusted for different demands. Example: enlarging the overlap section or extending it further above the trampoline will stiffen and strengthen the system for heavier or taller individuals whereas mounting the overlapping section below the trampoline frame will add flexibility for lighter individuals.

Slip fitting the poles allows the court to fit on different height trampolines. Example, 10 foot trampolines are 20-24 Inches high, 14 foot trampolines are 33 -- 36 inches high. End-user modification is simplified. A swage joint requires the customer to cut off the bottom of the lower Pole to adjust the height versus a slip fit joint that requires the customer to drill a hole through one Pole or spaced apart holes could easily be provided during manufacture.

Packaging:

By overlapping the poles completely for packaging purposes they occupy nearly half the space of a swage fit, or non-slip fit product. This new packaging design for outdoor play structure equipment yields some significant cost saving advantages in boxing, warehousing, shipping, as well as floor space for the retailer. The By leaving the dimple (generated during the tube cutting process) at one end of the larger Pole, the larger shorter Pole is prevented from completely sliding over the smaller longer Pole. This stops the larger Pole from sliding freely during shipment potentially blowing out the box end. Slipping the foam over the poles also prevents the larger Pole from slipping during shipment, protects the finish (painted), prevents the boxes from crushing when stacked by removing air space, provides a protective cushioning barrier between the poles and the fragile assembly videotape. The packaging also instructs the end-user/consumer in assembly, saving costs associated with customer service.

Landscaping:

The JumpCourt system can also be used as a trelis for growing different plant materials such as ivy, to hide or blend the JumpCourt into the surrounding landscape (sometimes required by local planning ordinances), to provide shading for users, to protect the court and trampoline from UV damage, to provide a wind break, to provide a privacy wall (especially good for those who appreciate the opportunity to enjoy the great outdoors in their birthday suits).

Top and bottom strapping woven through net.

Because the extruded netting is practically inelastic it would be impractical to stitch a more elastic flexible cord or strap to the netting. The difference between the elasticity properties of net and strap would generate excessive sheering forces on the stitching during impact leading to premature or failure of the stitching. The JumpCourt system allows both strapping and net to coexist because the strap is woven through the net and not stitched in place-- allowing the two to move at different rates and yet to conform to the forces that each place on the other during an impact.

Method for installing the JumpCourt on trampoline where connecting the JC poles to the legs is impossible or undesirable (may be used at leg connections).

Attach the JC Pole to the trampoline frame. Place a can (approx. 1ft. deep by six inches in diameter) or dig a hole in the ground directly beneath JC Pole connection to the trampoline frame (the can/hole may be moved in or out to adjust the angle of the JC Pole). Now place the end of the JC Pole (pole extension--elastic, flexible, or inflexible--may be added if needed) into the center of the can and fill the can with rock, sand, rubber, cement, or any medium (can be layered) to vary the shock absorption ability of the poles. This installation technique allows infinite variation of pole placement around the trampoline.

Different methods and for mounting the poles on the trampoline frame.

The JC poles can also be mounted at the inside of the trampoline frame. In this configuration the existing padding would need to be notched to prevent the padding from being pushed inward thus exposing the frame.

The double U bolt connection can be used to connect the JumpCourt pole in line with the leg of the trampoline or at any location along the trampoline frame. The lower U bolt connection can be used to connect the JC pole in line with the trampoline leg or at any location along the horizontal leg section providing that it is at least one inch above the ground.

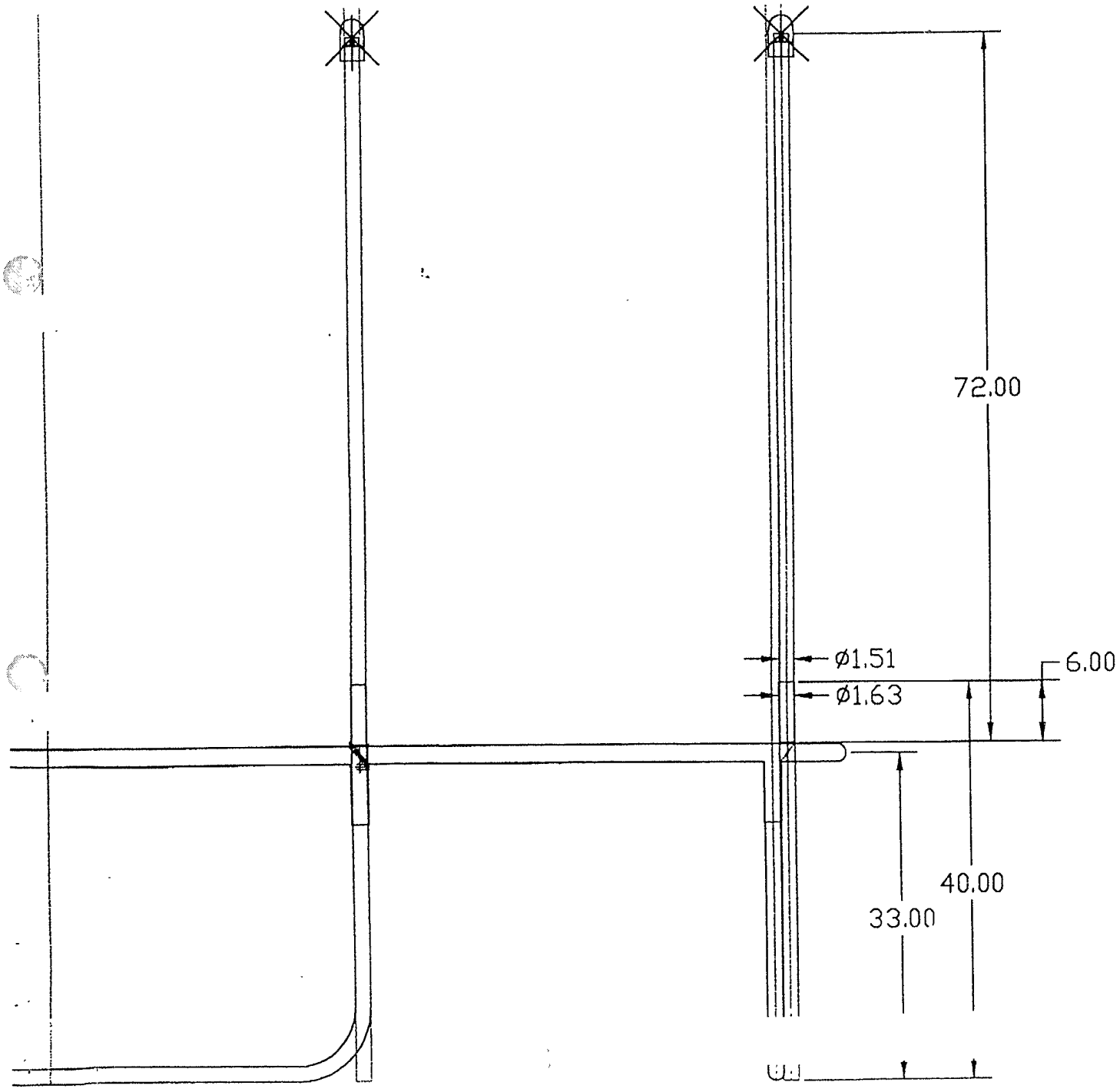
Other methods we have used include the following.

A simple shock cord connection at the top which allows the JumpCourt pole to move when impacted. Best used for lighter weight individuals and children and allows for less pole padding as it provides a flexible connection in contrast to the hard U. bolt connections. The shock cord holds itself in place under tension using a simple loop at one end and a ball at the other end. The cord is wrapped around the JC pole and the trampoline leg and then crosses itself at the top of the trampoline frame as he wraps around the JC pole where the ball is slipped through the loop while under tension. This kind of elastic connection is not recommended for large or heavier individuals as explained in this patent.

The use of plastic ZIP ties with non-release or releaseable connectors makes for an inexpensive and quick connection but without the durability of steel or the elasticity of the shock cord.

Screw adjusted hose clamps can also be used for a quick more durable connection but without elasticity unless a rubber or other shock absorbing material was placed in between the pole and the clamp.

We have also designed several wire form clamp configurations with quick release connectors similar to those used on glass jar lids that use rubber casket's to seal. Some of these connections incorporate springs allowing the JC pole to move upon impact.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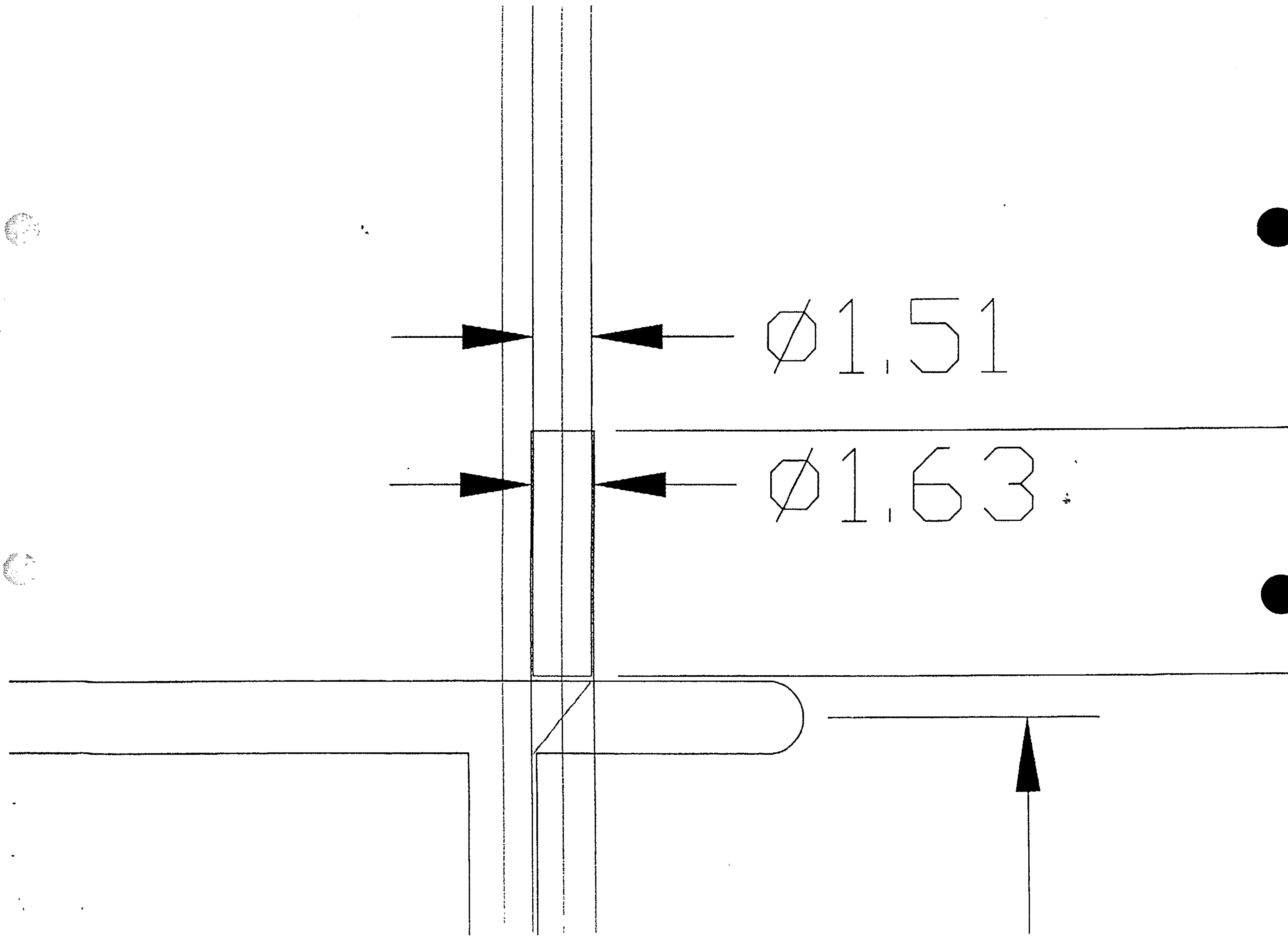


Drawing 02179801
End Cap

Ball top fits inside skirt bottom of another End Cap, allowing male-female nesting for reduced packaging volume
Ridge at top of neck to prevent movement of Support Pole into top of ball during assembly or upon impact, and positions End Cap and Upper Support Pole so mating holes line up for easy assembly
Skirt diameter sized to accommodate two sizes of padding thickness while deflecting rain at padding end
Rounded surfaces to prevent injury

Drawing 02199801
Webbing

Flexible woven material to move under tension adding third level shock absorption
Flat surface to distribute load evenly against mating materials (foam, net) on all sides and under insulation rotation
Maintains load distribution when load vector changes direction as webbing unrolls
Soft flexible material does not injure upon impact

Drawing 02199802
Bungee Assy

Elastic material for secondary spring/net suspension and impact absorption
Elastic connection to trampoline frame for energy absorption
Insensitive to tolerances of mating parts
Self tensioning within design range for ease of installation
Soft flexible material does not injure upon impact

Drawing 10219702
Lower Support Tube

Slip-fit to mating pole for packaging
Rounded surfaces to prevent injury
Sized to allow attachment to smaller diameter (shorter) trampolines

Drawing 10219703
Upper Support Tube

Slip-fit to mating pole for packaging
Rounded surfaces to prevent injury
Sized to deflect under impact and absorb energy

Drawing 10279704
Foam Tubing

Soft flexible material does not injure upon impact
Flexible material acts as fourth spring for distributing load due to direct impact or tension of webbing
ID larger than OD of pole acts as pivotal bearing allowing impact force to be transmitted and absorbed over primary and secondary poles (allows "unreeling" of net)

Drawing TC-0009
Upper U-Bolt

Threaded fastener allows attachment of TC to legs of different diameters
Clamp and U-bolt allows pivoting and rotation of poles to transmit and absorb forces by primary and secondary poles

Drawing TC-0010
Lower U-Bolt

Threaded fastener allows attachment of TC to legs of different diameters
Clamp and U-bolt allows pivoting and rotation of poles to transmit and absorb forces by primary and secondary poles

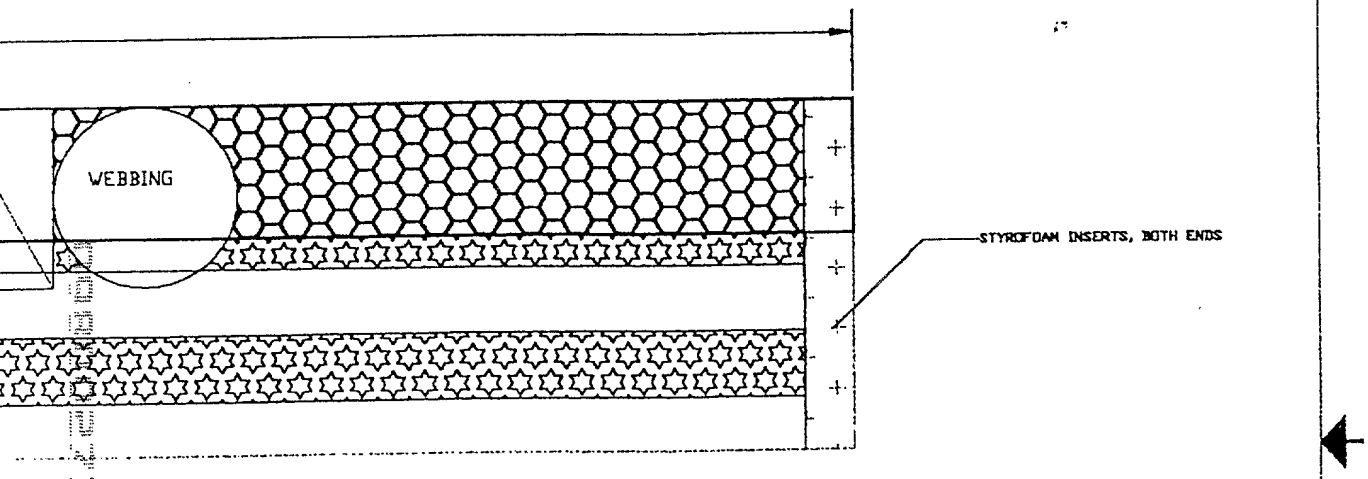
PF-9710001
Net

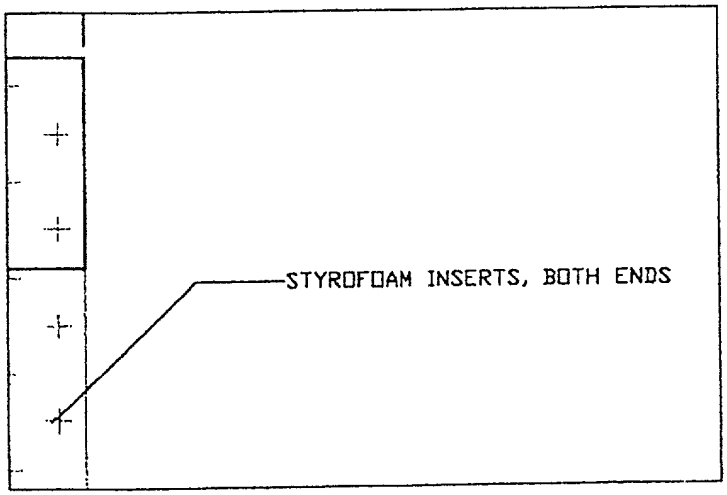
Extruded fiber cross-section not conducive to climbing misuse
Polymer extruded fiber construction acts as primary shock absorber

General

Cantilever mounting of poles to trampoline legs uses deflection of poles upon impact to absorb shock
Top and bottom webbing constrains and distributes pole deflection
Lower webbing constrains and synchronizes net deflection with trampoline bed movement
Lower webbing restrains spring cover pad and keeps in place
Tunable net suspension spring rate by changing the number of "barberpole stripes" of webbing around foam

REVISIONS				
ZONE	REV	DESCRIPTION	Date	APPROVED
	1	PRELIMINARY	3/11/98	JSP
	2	REVISE FOR 2-3/4" FOAM	3/16/98	JSP
	3	3" FOAM LAYOUT=LARGE NET	3/25/98	JSP
	4	ADD NOTES	5/19/98	MVP





PART NUMBER	DESCRIPTION

SPECIFIED:
CHES.
HIN.
TION

MATERIAL:

FINISH:

DRAWN BY: B. LOU — DATE: 3/11/98

ENGINEER: B. LOU — DATE: 3/11/98

CHECKED BY: JSP — DATE: 3/11/98

SCALE

JUMPSPORT, LLC

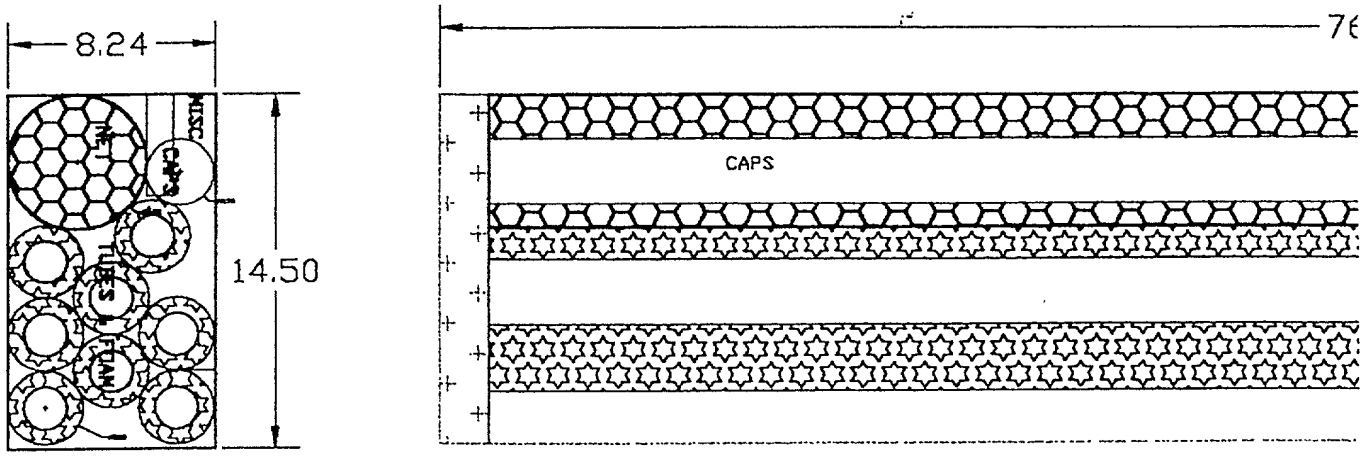
(408) 866 3120 / (408) 866 3124 FAX

PACKAGING, BOX

INSIDE DIMENSIONS/LAYOUT

SIZE B | DWG NO. 12049701 | REV 3

Scale FULL | Sheet 1 OF 1



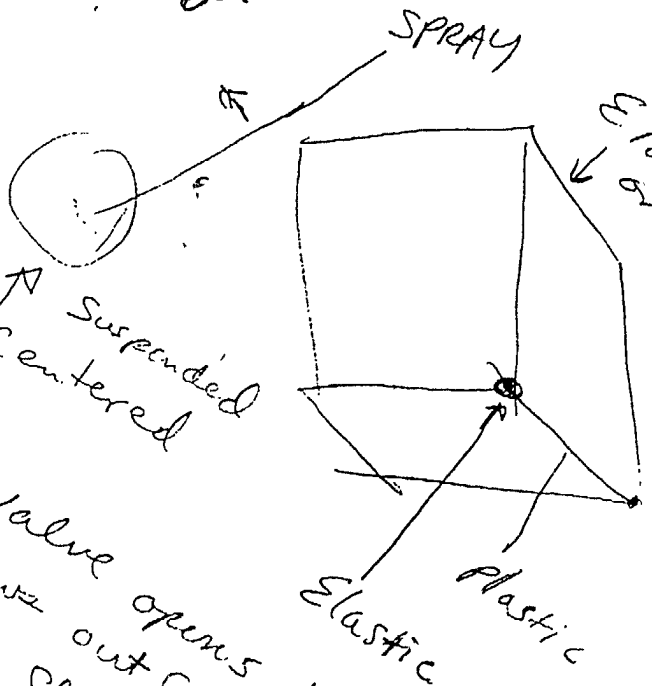
Notes:

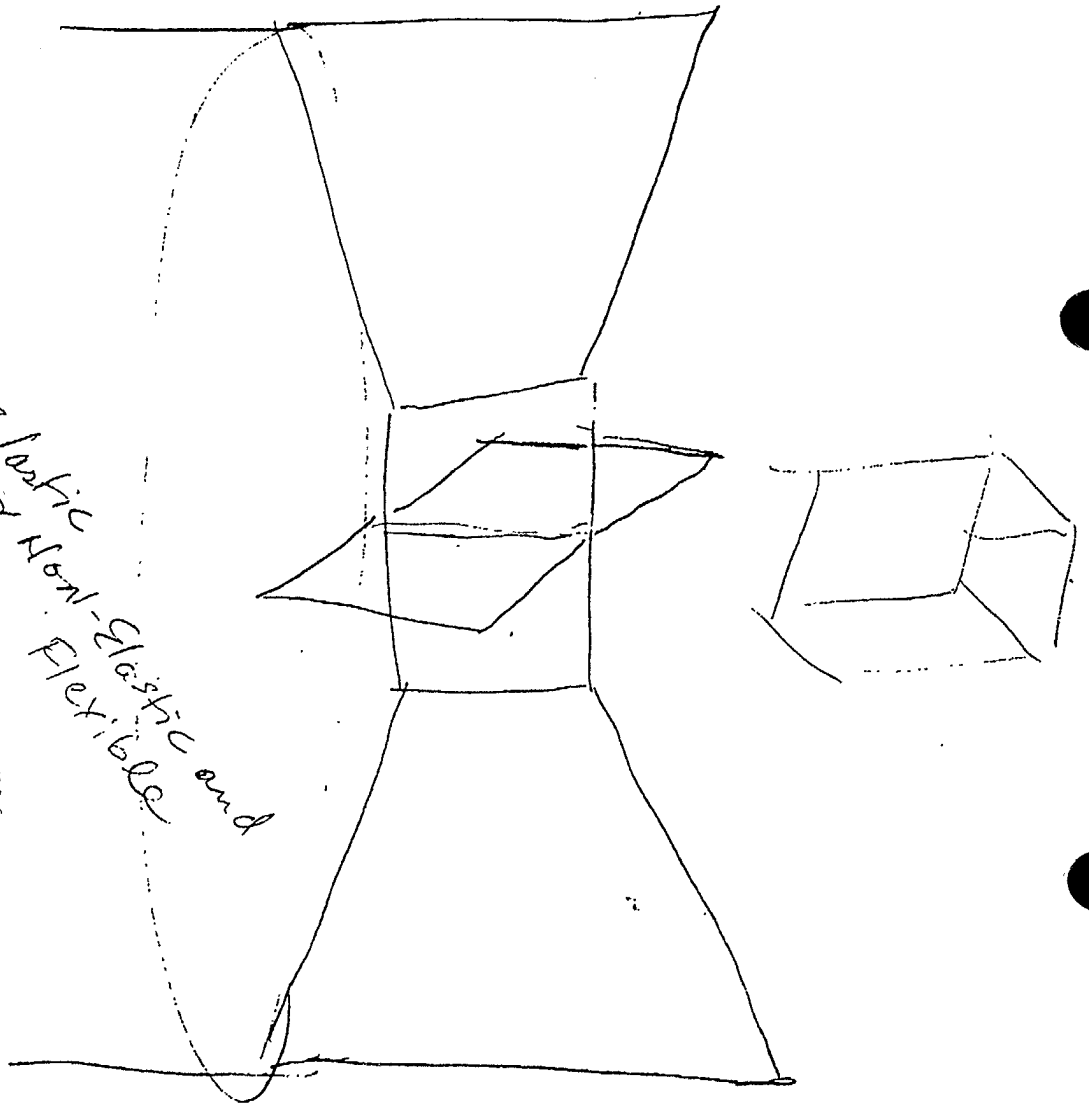
1. Packaging configured to save space, protect pole finish, prevent box from easily crushing, minimize packaging inserts, reduce material movement inside the box, reduce shipping costs by reducing overal package size.
2. Upper Support Pole slip-fitted inside Lower Support Pole. Both slipfitted inside Foam Padding. Stacked steel poles prevent stacked boxes from crushing lower boxes and foam tubes during shipping, allow for lighter box material with less reinforcements and inserts. Foam protects surface finish of poles and frictionally prevents shorter pole from slipping and punching out box end.
3. Caps fitted male-female in single stack to reduce dead box space.

DASH	ITEM
UNLESS OTH	
ALL DIMENSIONS	
.X	+/- 0.03
.XX	+/-0.015
.XXX	+/- 0.00
ANGLES	+/-1
MACHINED FINISH	
BREAK ALL EDGES	
CHAMFER ALL HOL	
ALL WELDS FULL	

DO NI

Spray speeds up by using a valve that opens automatically increasing water flow thus speeding up turning spray.





Valve opens as it screws out for some other method when shut off from outside

Multiple heads for diff. spray patterns & games

or single larger head which has clocklike screw-in-out valve that actuates diff spray patterns.

Claim ALL types of Elastic cords over an elastic rebound surface.

Claim water stream generating devices under/over rebound surface used to play games

Canopy

JUMPSPORT PRE-SCHOOL MAT

HANGING BALLS LABELED W/ NUMBERS, COLORS, ALPHABET, STARS ...

GAME W/ PATTERN ON RED OR BLUE (CLOCK PATTERN, N-S-E-W, WORLD, NUMBERS, ANIMALS

PATTERN ON BOTH SIDES
ATTACH W/ BUNGEE &/OR VELCRO TO BED,
WATER-SPRAY TO DISSIPATE BALL/REDUCE FRICTION & STATIC BUILD
MAKE SURFACE TO ATTACH VELCRO ONE SIDE

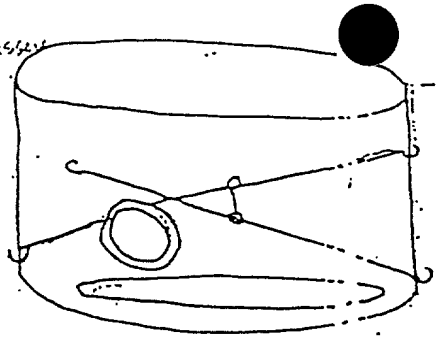
GAME PIECES

GROUNDING STRAP TO GIANT STATIC CHARGE GENERATED BY FRICTION

Donald Strasser

Tramp Cha[illegible] - Donald Strasser

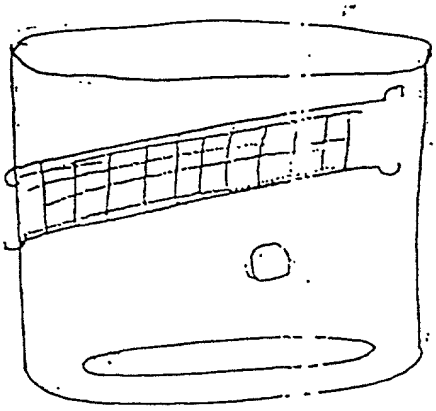
-Players start in diagonal quadrants. At least two cords are stretched across court, and hoops or other obstacles may be attached to them.



- Someone says go; and th players race around in t same direction, either over under each of the cords, whi the players have determine Player wins by catchin to and tagging this opp

Tramp Ball - Generic

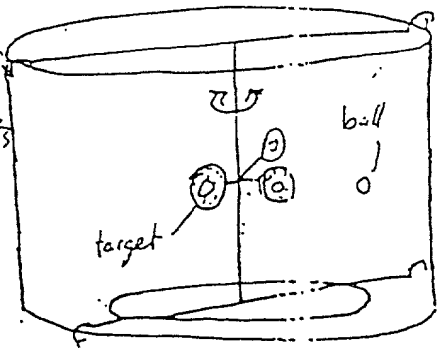
-Players are on either side of net stretched across the court Net is placed higher for more challenge. Ball is soft Nerf-type about the same size as a soccer ball.



Players throw or hit over the net. If opp misses ball and hits back mat panel of the a point is scored. Oppo has one bounce of his on the trampoline or les catch ball and throw o it back to the other

Tramp Shot - Donald Strasser

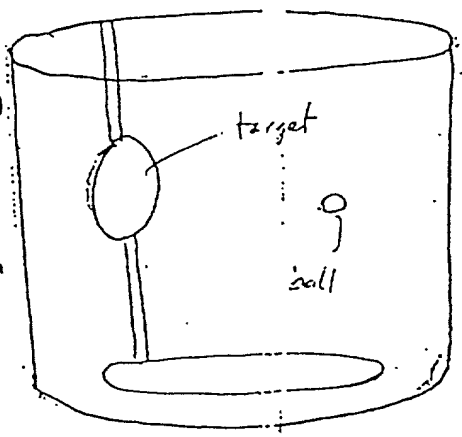
-2 Bungee cords stretched across the court, one high and one low, suspend the "target". Target consists of three disks which may rotate. Small, soft, bouncy Nerf-type ball about 4 in dia is used



- Players may move anywher in court. serves by hitting t ball at the target, missed the opponent ge point and the serve ball hits, the opponent 2 or three bounces of ball on the trampoline the ball and throw it to the target

Tramp Back - Donald Strasser

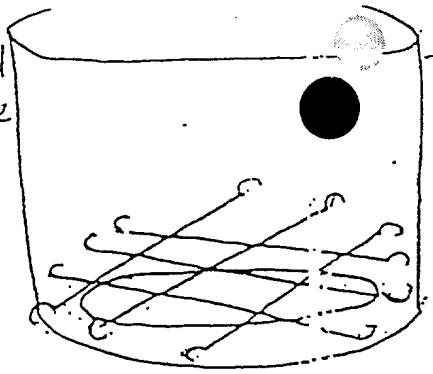
-Players start anywhere in the court. Target is a large (3' dia) plastic disk mounted securely against one pole. Ball is small, soft, and bouncy but lightweight pneumatic-type plastic ball, about 4 in dia.



-Players may move a in the court. One s by hitting or throwi the ball against the Opponent has one of the ball against trampoline to catch ball, and may only one step before th [illegible] at the tar

Tramp

- Many cords are criss crossed across the court at the same or varying heights

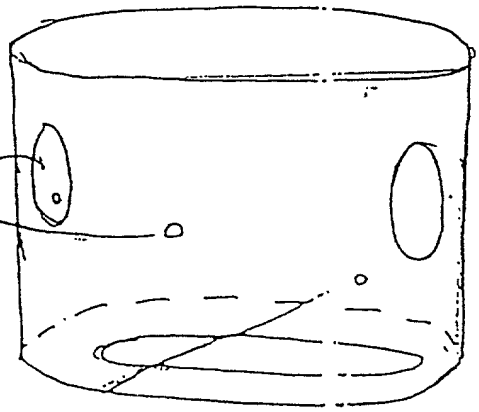


- Players must jump one square to another a player-determined For more challenge, may not touch any cords when making jumps

Tramp Pass

- Mark Publicover

- 2 circular targets, (3' in dia) are securely attached to opposing poles in the court. Each is covered with the hook side of Velcro fastener. A small, soft, ~~regular~~ weight ball is covered with Velcro loop fastener. A cord along the surface of the tramp separates the two players.

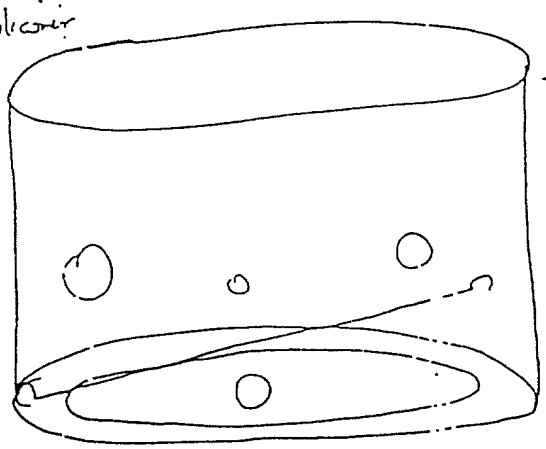


- Players throw the the opponents targ the opponent tries block or catch the p:int is scored if the sticks to the target. the opponent has th he can throw the b at the other target more challenge use balls

Tramp Tag

- Jacob Publicover

- 3 to 8 balls of varying or equal size and bounciness are used.

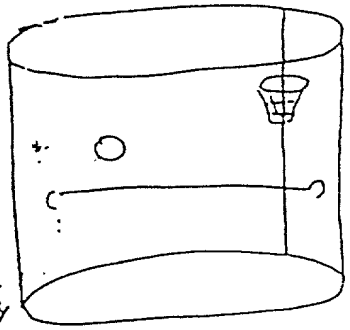


- Players bounce a the court in any dire They start with K losing one each tim a ball touches them last player left wit wins. Once a player out he leaves the c more challenge, use streched across the obstacles.

Tramp Basket

- Donald Strasser

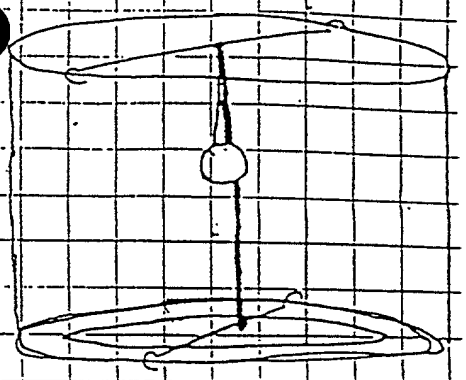
A Cord is streched across the court at below waist height. A small basket with a net is securely attached to one pole. A soft, bouncy nerf type ball that can easilly pass through the net is used



- Players either take turn a predetermined numbe times and the one with most baskets wins, o half court game can be In the half court game, player on offense shoot behind the cord. The p on defense may not tend.

Tether Trampball

- Donald Strasser
- Mark Publicover

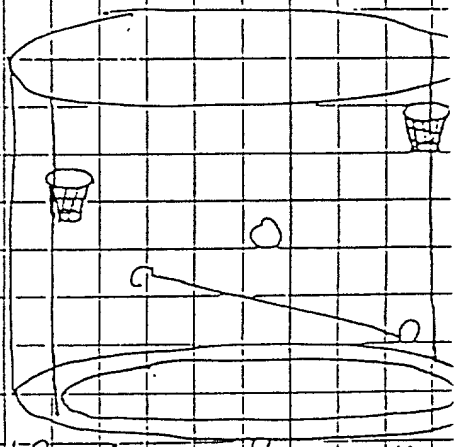


The ball is suspended from above the court by a bungee cord. A cord also extends from the top cord down to a cord across the bottom. The ball is a medium sized, bouncy, light weight plastic ball.

Each player is in one half of the court as made by the lower cord, and remains there the entire game. A player wins by hitting the ball until it wraps tightly and completely around the vertical cord suspended in the center of the court.

Tramp Duel

- Mark Publicover

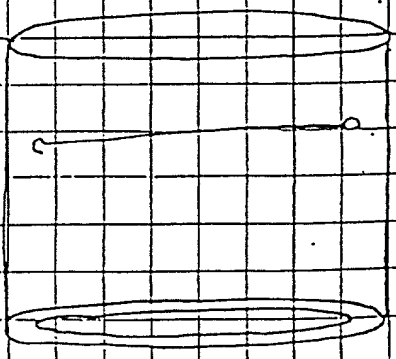


Two nets are securely attached to poles located across from one another. One cord runs across the court at below waist height dividing the court into two halves with the nets at the back of each. The ball is medium sized and soft.

Each player remains in his half during the entire game. Points are scored when a player makes a basket. The defender may block a shot, but may not goal tend

High Trampp

- Donald Strasser

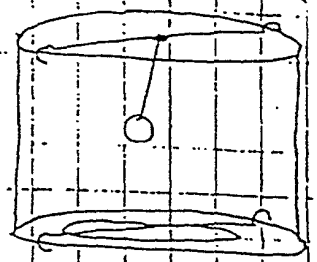


A cord is stretch across the net, starting out at waist height.

Just like the high jump, each player attempts to jump over the cord from one side to the other without touching the cord. Each player gets three attempts to jump each height. If both succeed, the cord is raised. The player to make the greatest height wins.

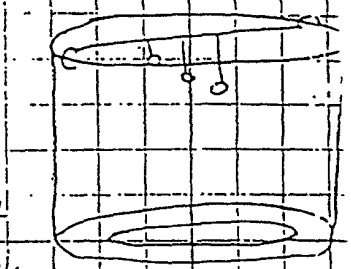
Tether Tramp II - Mark Publicover

Similarly to Tether Tramp I, the ball is attached to a cord which is suspended from an overhead cord. The object is to throw the ball around the horizontal cord. Each player tries to wrap up the ball in opposite directions



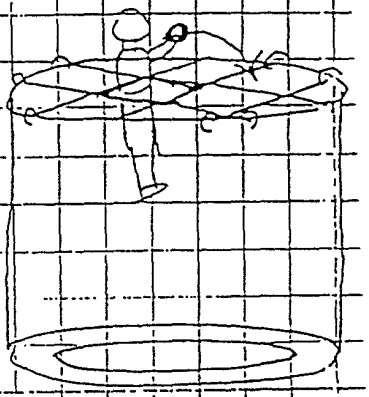
Tramp Touch - Donald Strasser

A cord is stretched across the court. From it, balls are hung at graduated heights. This allows small children the challenge of jumping up at hitting them at progressively greater heights. They can see if they really did touch or not because the ball will be swinging. For greater challenge with larger k hang the balls from the upper part of the Trampbrella bot



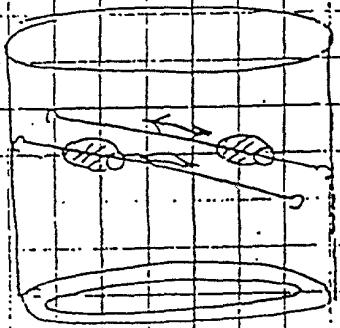
Tramp Throw - Mark Publicover

Cords are stretched in a grid across the top of the court. Game is played by jumping up through a certain square and throwing the ball down through another specific square.



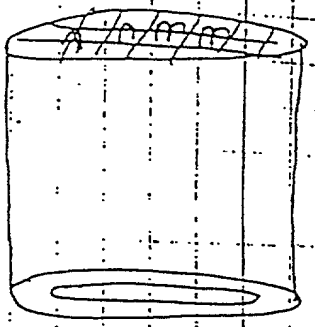
Tramp Slide - Mark Publicover

Each player attempts to slide one of two soft "buoys" across to the other side of the net. If it hits the other side without the opponent blocking it, the player scores a point. For additional challenge, a cord separating the two buoys for both players can be added. This requires the players to jump over the cord to get between the two buoys.



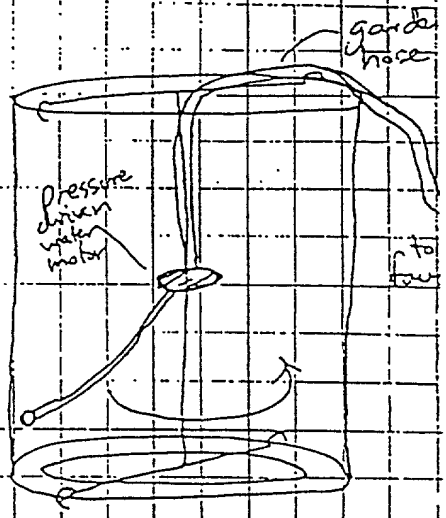
Tramp Hook - Mark Publicover

Each player has a different colored set of "hooks". The grid at the top of the cart is divided into different sections, and they score by putting their hooks in their color coded spot for each section. Each player is in a separate section, and they rotate when one completes his section.



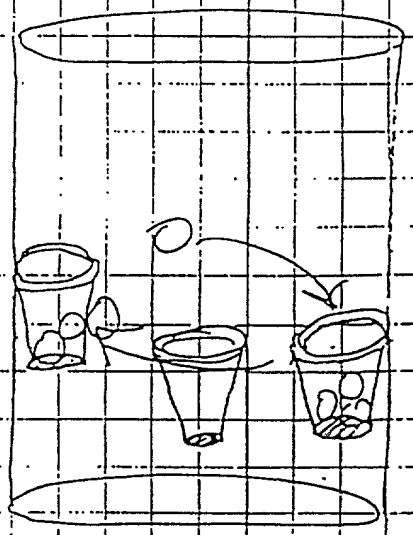
Tramp Jump - Mark Publicover

An ordinary garden hose is attached to a water pressure driven motor suspended in the center of the cart. Attached to the motor is a soft rubber foam rod with a soft weight at one end. The motor turns the foam rod around the cart, and the exiting water splashes around the cart. Players avoid the foam rod by jumping or ducking. Its weight may be varied.



Speed Ball - Mark Publicover

2 Players have 2 different colored sets of balls, and a matching colored basket. They race to grab balls of their color (only one may be carried at a time) out of the center basket and put it into their own. Variations can be played with no center basket, or with players stealing or blocking each others balls.



Entry completed

Anata Strasser

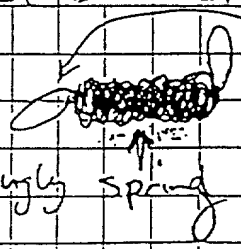
Games (Continued):

Hip Hop – Conceived of around a month ago, this game calls for one hoop or a number of hoops attached to the participants' hip. The participant bounces on the trampoline causing a ball to bounce off of the bed.

The participant must jump & move to score the ball through the h

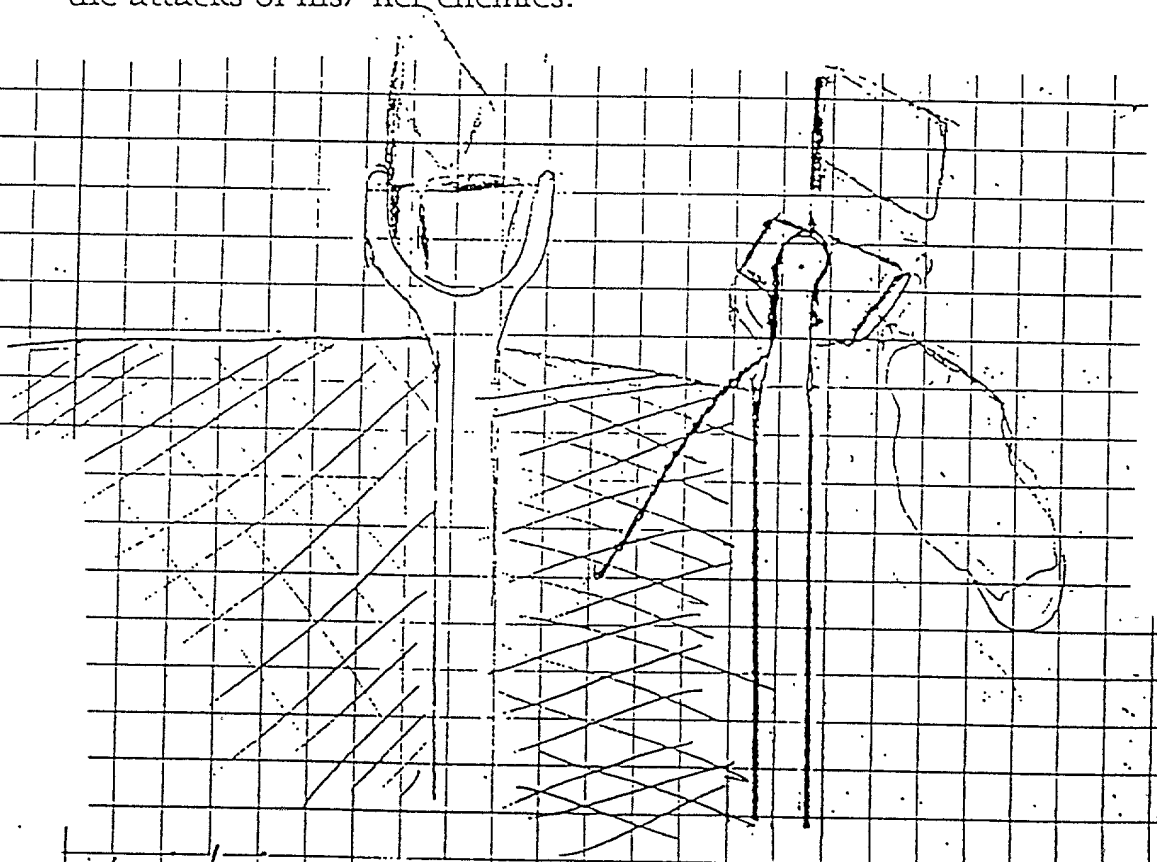
for two players, the hoop/hoops are attached at the waist of the pa try to shoot (using hands) the b into their opponent hoop(s).

Game Hoop - A hoop that made out of plastic would be attached to a jumpcourt post. The hoop would b durable and can be spring loade so that it will spring back to standard/normal position after being hit (spring-loaded breakaway hoop system). Sp would be internal and be run horizontall through the hoop.



#2) Castle Siege

Castle Siege- The player on the trampoline is defending his or her castle from attach. His weapons are buckets on each post (a.k.a. Castle Caldrons) filled with water that he can capsize onto the players outside if they get too close. Participants on the outside are trying to "seige the castle" by knocking the castle flag from where it hangs proudly using bean bags/foam balls. The indivual who captures the castle then becomes King or Queen. The current "King" must block/ capture the beanbags, and if he secures them all, the game ends (and he or she will continue to reign). It takes bravery -but watch out, if the King/Queen hits you with water, you are put into the dungeon until the kingdom falls. One way tool that the "seigers" have are sheilds to defend them from the water. Bungipults (a.k.a flingerthingers) may be used by participants outside, sending in water projectiles (water baloons) or by the King/ Queen to weaken the attacks of his/ her enemies.



Variation(s) Flags are mounted to each post, and the Kingdom is claimed only when all of the flags are knocked down. The flags are velcroed to each flag post so that they may be attached

easily and also so that only the material falls.

Ramification: In the place of flags, a small bubble pocket made of netting would be the target mounted over each "Castle Cauldron" When each pocket contains a bean bag or Spash ball, the Kingdom would be successfully conquered.

Design/ Configuration: A small bucket is mounted to each post, secured on two sides to a "Y" that arm that is mounted to the post so that it may pivot. The bucket has a cord secured to the outside portion of the bucket. When pulled the bucket tips outward, ejecting the water contained in it.

Water is fed to the buckets from a single garden hose attached to a ~~invisible~~ double ~~split~~ "Splitter". Tubes are attached to the splitter

Soakerball (or spongeball)- Players on the outside could dunk foam balls into a water bath, and send it in to the JumpCourt.

Cord Games

Orbital Jump Rope- Rope will either be adjustable in lengths for single/ multiple play, and can be attached to the JumpCourt posts

Bungi cords are attached in a gridlike fashion to the top of the JumpCourt posts. The individuals on the outside have bungi bouncers (with hooks) that they are sending into the the JumpCourt, and gain certain points for entering the different holes.*

Cord tag- A cord is attached to one JumpCourt post, the other side is secured to a cord running perpendicularly which has ends that participants on the outside can pull back in forth. The cord attached to the post can move (and may have a ball attached to it) ; the object of the game is to tag the person on the inside with the cord while he/ she is jumping to avoid it. Once tagged, the players switch.

High HighJump.- Player can adjust the heigth of the obstacle they must jump over.

Mirror, Mirror- Two players play this game at one time, one is the "person," and the other is the "mirror." The tramp Court is divided into quarters (or sixths, or eighths) using jump cords. Every good mirror gives a perfect reflection.... if the person jumps right, so must the mirror; if the person does a one-eighty, so must his or her mirror; if the person pulls a 360 to cord straddle, so must the mirror. This is a game you are actually trying to "break your mirror." Three breaks, and its *your* turn to be the mirror

One hoop is suspended in the center with a bag/net attached to it. Play or players bouncing around on bed try to bounce the ball into the hoop without using their body directly. Hoop is raised for greater challenge.

A variation on this game would be to have players inside defending the goal, while players on the outside make shots. The participant on the outside earns points by successfully putting the ball through the hoop (perhaps only if the player on the inside does not catch the ball before it hits the ground).

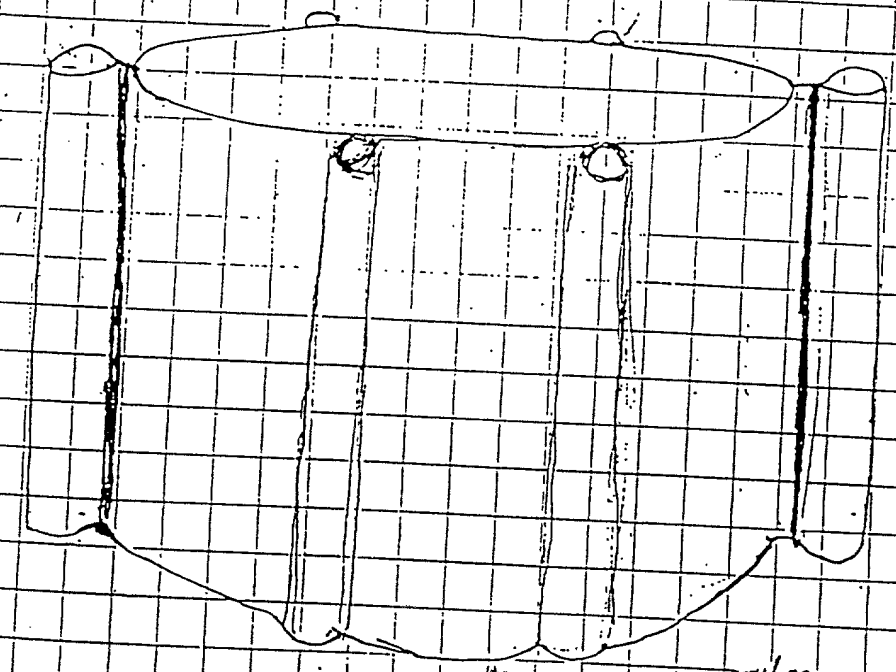
Ball is used with a hoop that is just slightly larger. The net or bag beneath the hoop does not allow the ball completely through. This increases the challenge and the demand for accuracy.

Variation: One player is in the Jump and other players are outside with balls (preferably pneumatic). The player on the inside must ~~[illegible]~~ complete one trip "around the world," jumping through each section without touching the cord. ~~[illegible]~~ After the player make the trip 'round the world,' he must finish the game by jumping into the hoop. Meanwhile, the players on the outside must shoot a ball into the hoop before the inside player ~~[illegible]~~ finishes the game.

Reinforcement Post configuration:

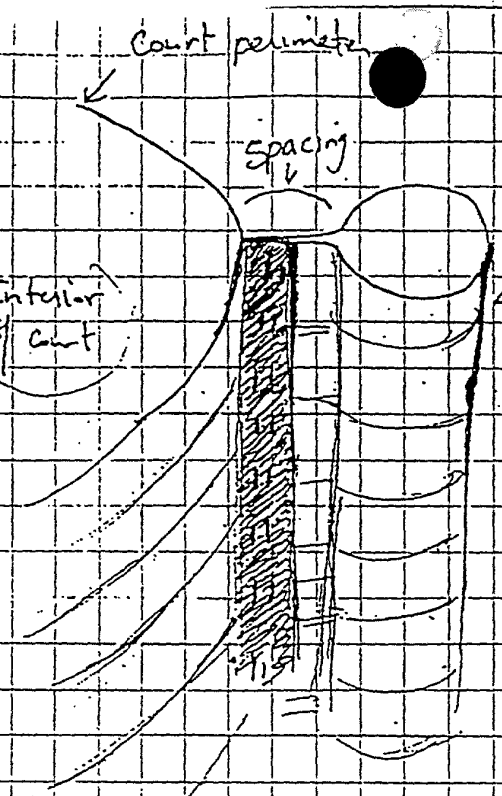
PVC or [redacted] flexible tubing can be used in conjunction with Steel post, placing the pvc tubing on top of the Steel posts, or making every other post alternating between the two same materials. (e.g. Steel post/ pvc post/ steel post/ pvc)

Untitled design: Softer springs/bed, better padding, etc.) Safety fence.



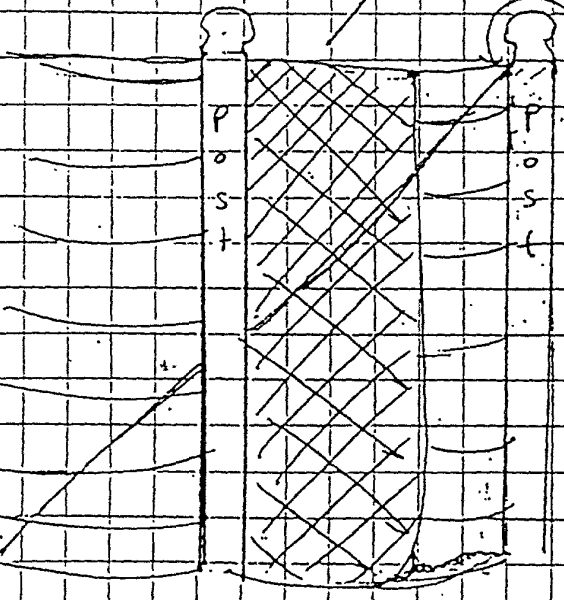
Fence is made out of woven fabric, (polypropelene / polyethelene, nylon, polyester) folded and [redacted] sewn down the width (vertically). To be slipped over the posts to anchor it in place.

Webbing is se
to folded fabric for
Strength. Fabric Spacing
exists between court perimeter
and post sleeve so
that; 1) impact into post
is reduced by having
inside perimeter separated
from posts. 2) Court
perimeter would equal
the perimeter of the trampoline bed so that court
would protect individual from the frame &/or springs.



Door Configuration

The arrangement
for the door is devised
to make access easy
but to discourage
prevent an individual
from falling at even
if they don't lock
the door closed the
way they should.



1) Door overlaps; one end is secured to post, second end terminates within the field

Jump Tomer

Around [redacted] 15/97 Donald [redacted] built a working prototype of the Jumpometer which I have failed to include until this point. Currently he has added phase #3 to the device which is a second switch for games using a target and a variety of settings for different elements. Phase #2 was attaching sound capabilities to the device. Currently the device has been tested and has the following qualities/capabilities

- Counts bounces on the trampoline bed (over the entire bed, and is quite responsive) records them on a digital display
- has a reset button + on/off switch
- has a second switch that records hits on a target
- has switches to select noises and which switches it is waiting (it can record bounces on the bed + hits on the target simultaneously or independently.
- it will have a countdown + a random delay to trigger a noise on a random bounce/hit.

This device can be used for measuring cardio + calorie burning activities as well as being utilized in many ways for games.

Securing a net/fence to the bed/frame reviewed + ramification discussed.

We have conceived and tested a number ways to secure the netting to the frame or:

1) Cable ties attached to net, and string thr (punctured) pad, then wrapped and the frame

(Strapping: elastic or non-elastic)

2) Strapping (webbing) ~~wrapped~~ or woven through holes and string through (punctured) pad & wrapped a frame.

3) Cable ties wrapped through fence, around outsid frame and secured to spring

4) Strapping around netting and frame, without pad padding

5) grommets attached to padding that strap or Cable tie could be string through, using metho #1-4-2-(in place of grommets, clips on page 31 could be

6) grommets attached to padding, cord is string through it, ~~#~~ string through net, and pulled tight (in place of grommets, clips on page 31 could be employed)

7) Same as #six, but cord wrapped around the fr (cord is)

8) Same as # Six, except cord is not wrapped through net. Instead, hooks are used like those on page 30 to secure the net to the frame

9) Much like #2 on page 32 could be attached to frame, and cable tie/cord/strapping could be secured to it in place of the frame ~~for~~ net utilizing methods 1-8.

b) netting could be secured to movable pad (inside of the padding or ring) using elastic/non-elastic cord / strapping.

1) netting could be slid under padding and connected to movable pad (padding could be secured to frame, or the net)

2) Additional padding could be secured to the frame, using tape or strapping or cord for velcro for protection & in the event that the pad is moved, and secured by method #1 - #1. The padding that came with the trampoline could be tied to the frame as minimal or to (which tends to pop) or attached to the net so that it can move with the impacting body.

) before hanging the net up, connect the net to the springs by either a) taking each spring off, & re-attaching it putting it through the mesh on the edge (with the bulk of the material above) and re-attaching it or b) taking each spring off, feeding each spring through a mesh on the edge (with the bulk of the material below) and wrapping the bulk of the material around the outside of the frame (taking off each leg and re inserting it between a mesh) and hanging it to the post.

Post / padding / webbing / net configuration

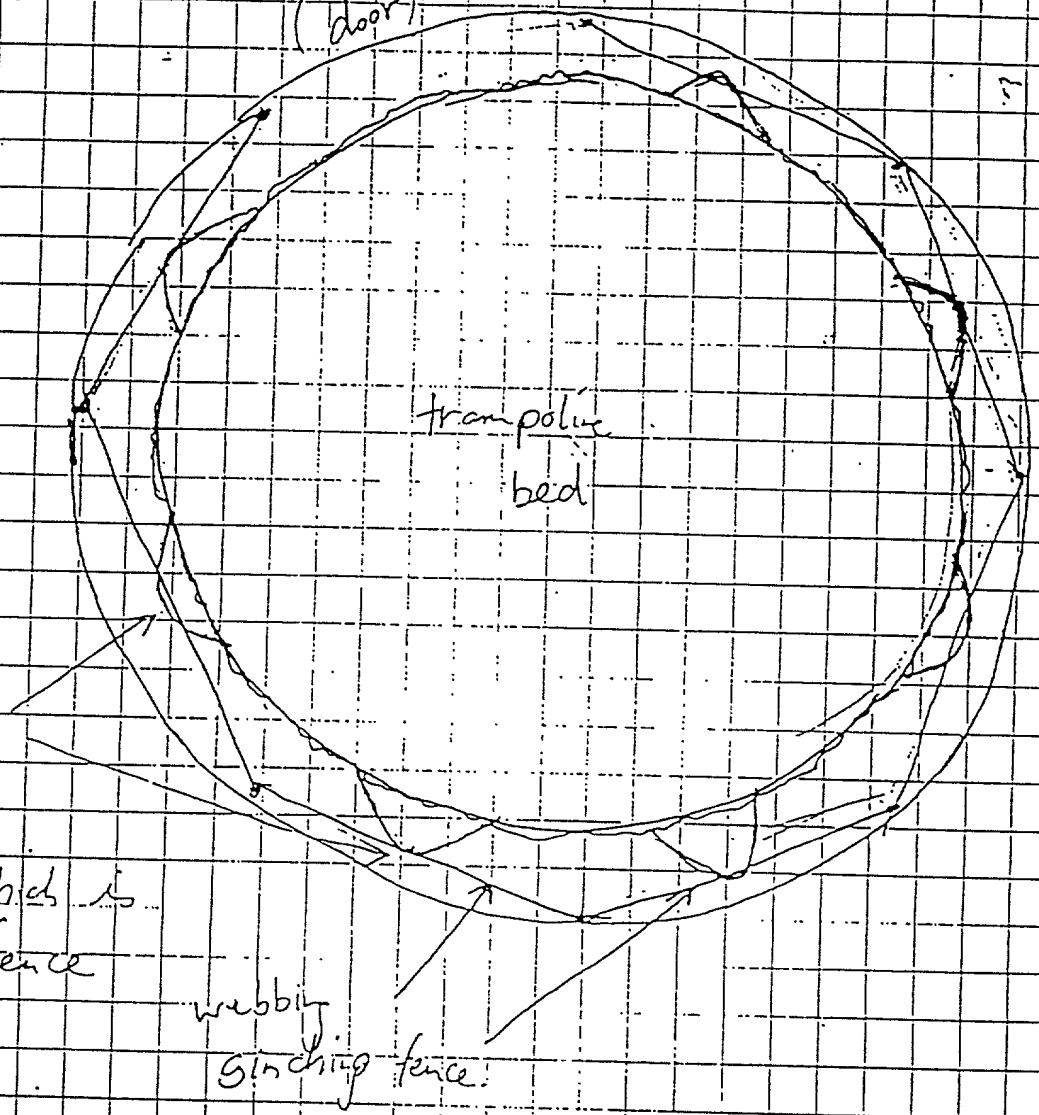
Recap padding is slotted over the post, and elastic or non-elastic cord / webbing is wrapped around the post and through the net it a decending spiral fashion. The padding not only absorbs energy from a direct impact to the post, but also helps to absorb energy from an impact into the net. The webbing / cord, spiralling around the post has more surface area than said cable ties, and therefore is to distribute weight better. In conjunction with the foam, this attachment of netting to the posts acts to absorb the impact efficiently. The posts, being semi-flexible also work not only to absorb the force of an impact, but also act to rebound the body toward the center of the trampoline.

[illegible] mentioning that the untitled [illegible] design may use the fence material we are leaning toward in our court design or any type of fabric that will perform well outdoors, like those on p. 44).

#14) Securing the bottom edge of the net) ramification a ramification alluded to in ramification #6 on page 52 is to have elastic/non-elastic webbing/cord woven through bottom of net, (cuts would probably need to be made in the fence at the posts) and fence drops below the frame of the trampoline and is finally tightly.

#15) elastic/non-elastic cord is woven through bottom edge and secured to the frame of the poster (one end is probably connected to one post, while the other end is tied to the seventh post. The cord/webbing is pulled tightly for seven sides of an octagon inside of the & the trampoline. Elastic/non elastic cord/webbing

is secured to the webbing and the trampoline bed in at least one place between each section.



Ramification to webbing/ cord configuration found on page 6.

Have webbing/ cord woven vertically through eyelets at posts. Using the "candy stripe" (spiral) configuration, attach the webbing/cord to the vertical webbing/strapping. This design distributes the weight of an

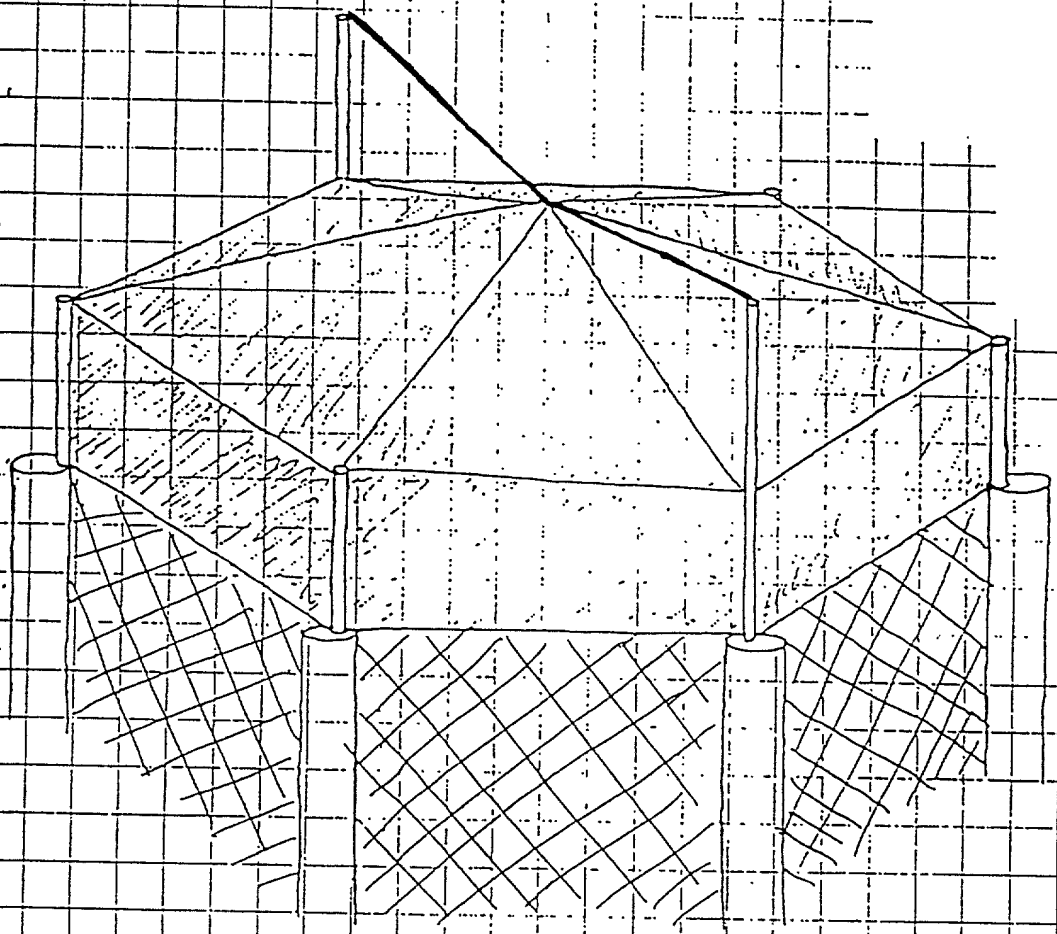
The arrangement could be a variety of combinations

Vertical Weave	Webbing	webbing	bungee	bungee
Spiral Candy Stripe (or "O" ring)	Webbing	bungee	webbing	bungee

↑ "O" rings could be used in placed of candy configuration).

TrampBrella

Purpose: Same as TrampBrella II



Description: Short (about 3 ft) poles are attached to all but two of the tramp court support tubes. Two long poles (about 5ft) are attached to the remaining tubes. A line runs between the two tall poles and is attached to the covering. The covering runs down to and is attached to the top of each of the small poles.

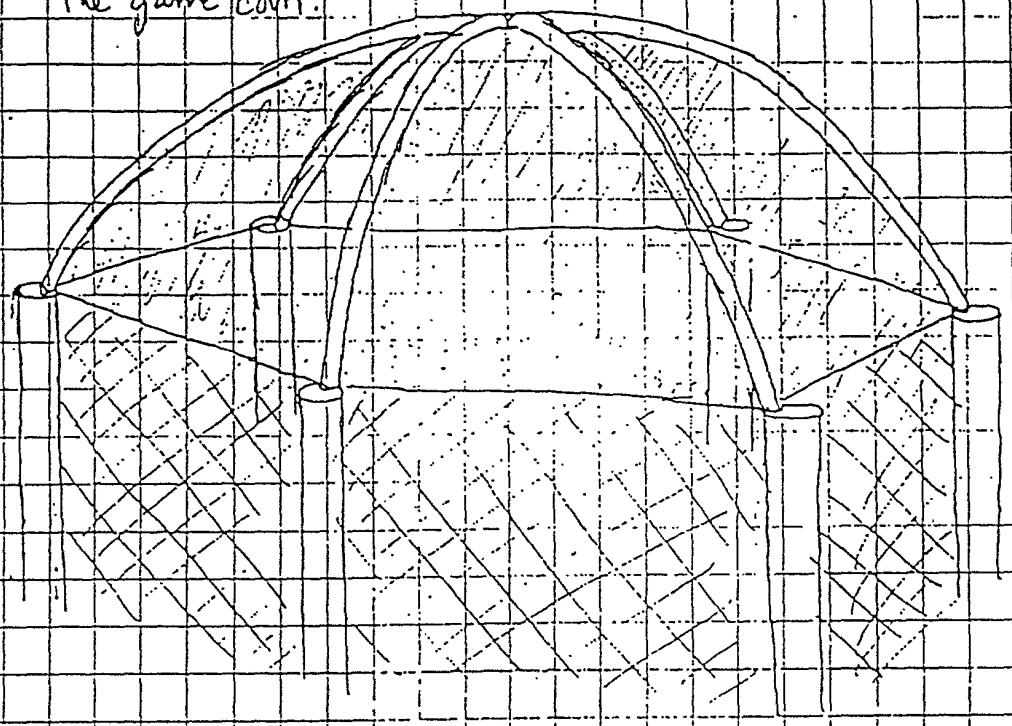
Construction: PVC plastic, or fiberglass for the poles, Netting, Canvas, tent, or awning plastic for the covering

Advantages: The court is completely enclosed. The covering is raised to a height where it doesn't restrict jumping anywhere within the court.

Tramp Brella II

Purpose: To provide shade, shelter, and sun protection over the top of a trampoline equipped with the tramp court. It may also used to attach overhead games (such as Tramp Touch). It also contains balls, for use with the game court.

Designs
Donald Str.
Drawn:
Donald Str.



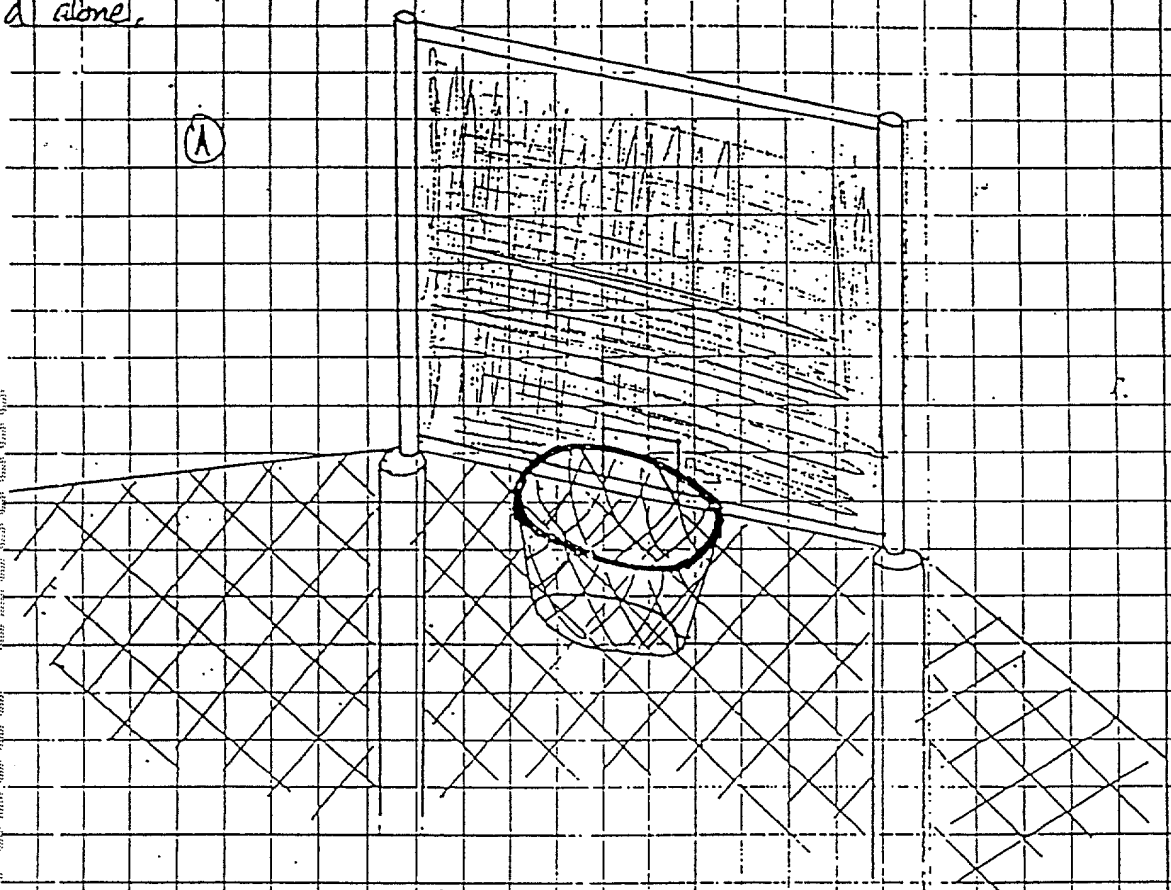
Description: Tent type poles are attached from the top of each vertical support tube and go to either an attachment piece at the center (as shown above) or all the way across to the opposite support tube (overlapping at the center). The design for the 6' support tube model is shown above. A Covering is stretched between the poles.

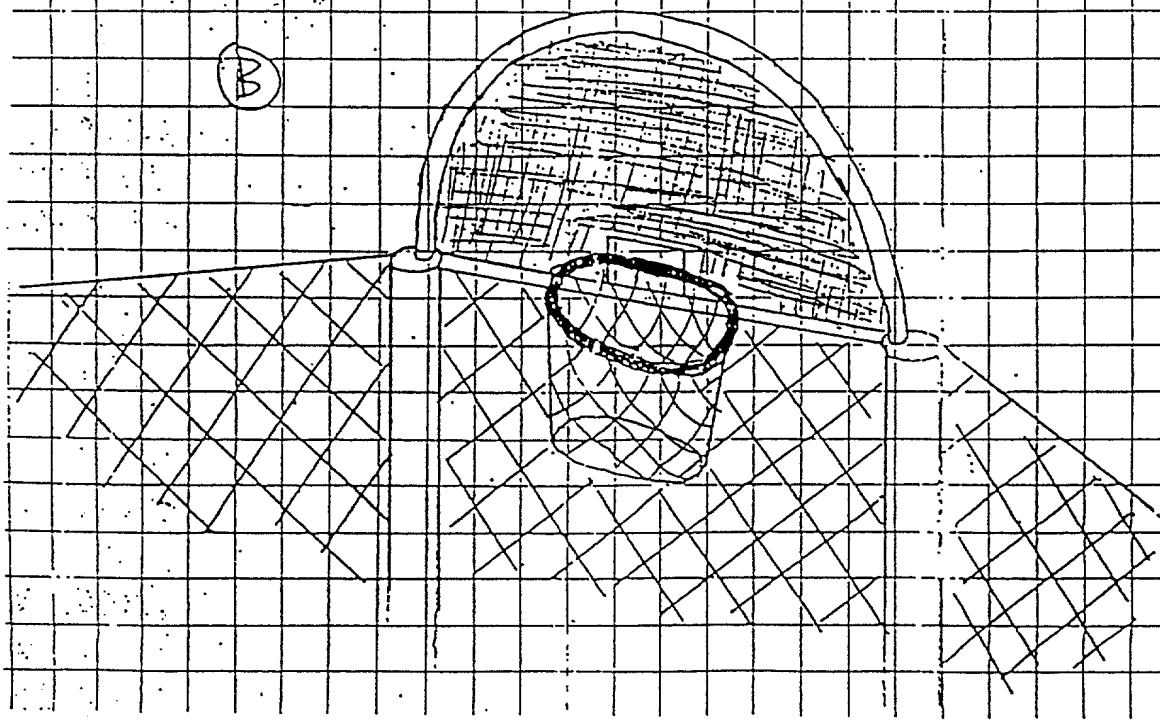
Advantages: Aesthetics - the design is simple, clean, and fits well with the tramp court configuration. Because of the curved supports, maximum overhead clearance is achieved in the center of the trampoline, where it is most needed. The frame is strong enough to support lightweight game attachments.

Construction: Either fiberglass or aluminum tent-type poles for the supports with netting, canvas, tent plastic, or awning plastic type covering.

The purpose is to provide a back board with a ...ketball-type hoop and net which attaches to the ...port poles of the ramp Court. The back board is a ...d sturdy, weather resistant plastic or finished wood. Integral, separate tube supports are located around the outer edges, shown in versions A & B. The hoop can disconnect so that it ... not interfere with jumping and so that the back board can be ...d alone.

Drawn:
Donald Strasser



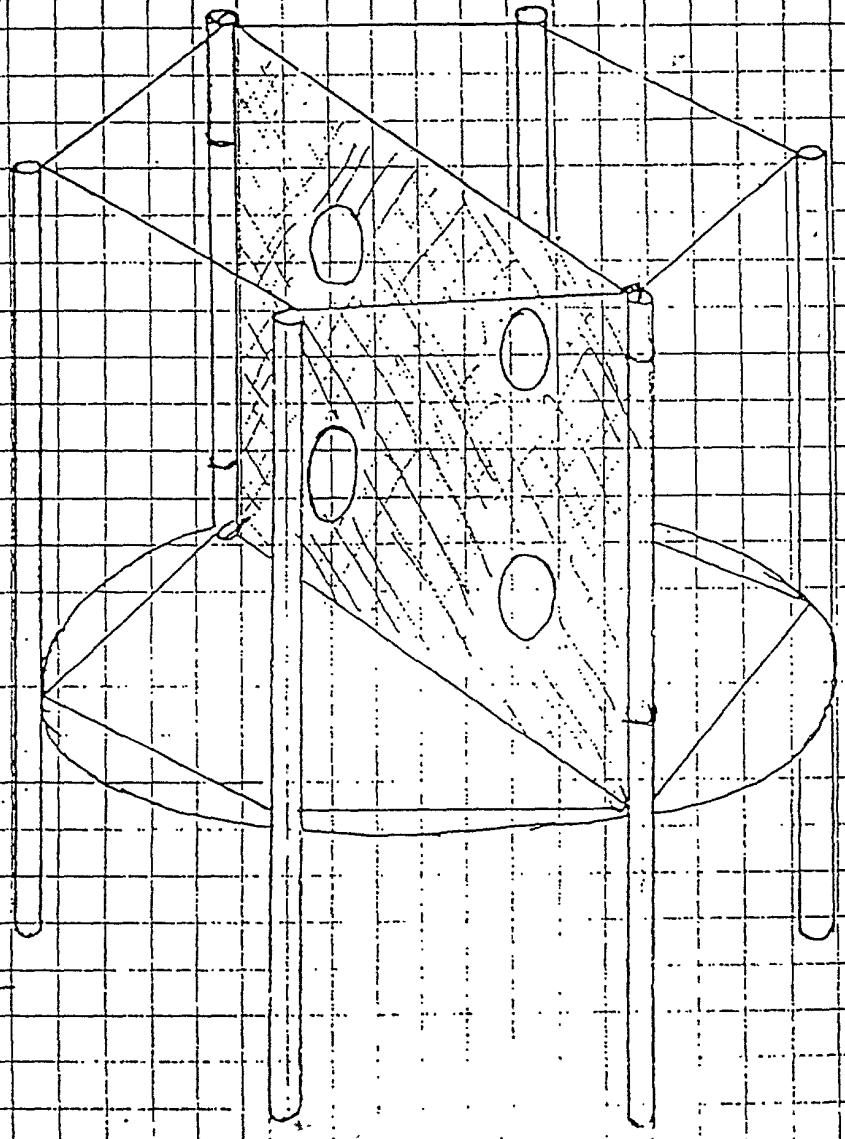


Tramp Court Game Screen

Drawn: Donald S

Design: Mark Pu

The Game Screen is an add-on to the Tramp Court system. It attaches to two opposite support tubs and runs across the diameter of the trampoline, dividing the bed area into two "cells." Any number of holes are made in the screen so that a ball of a given size may pass through

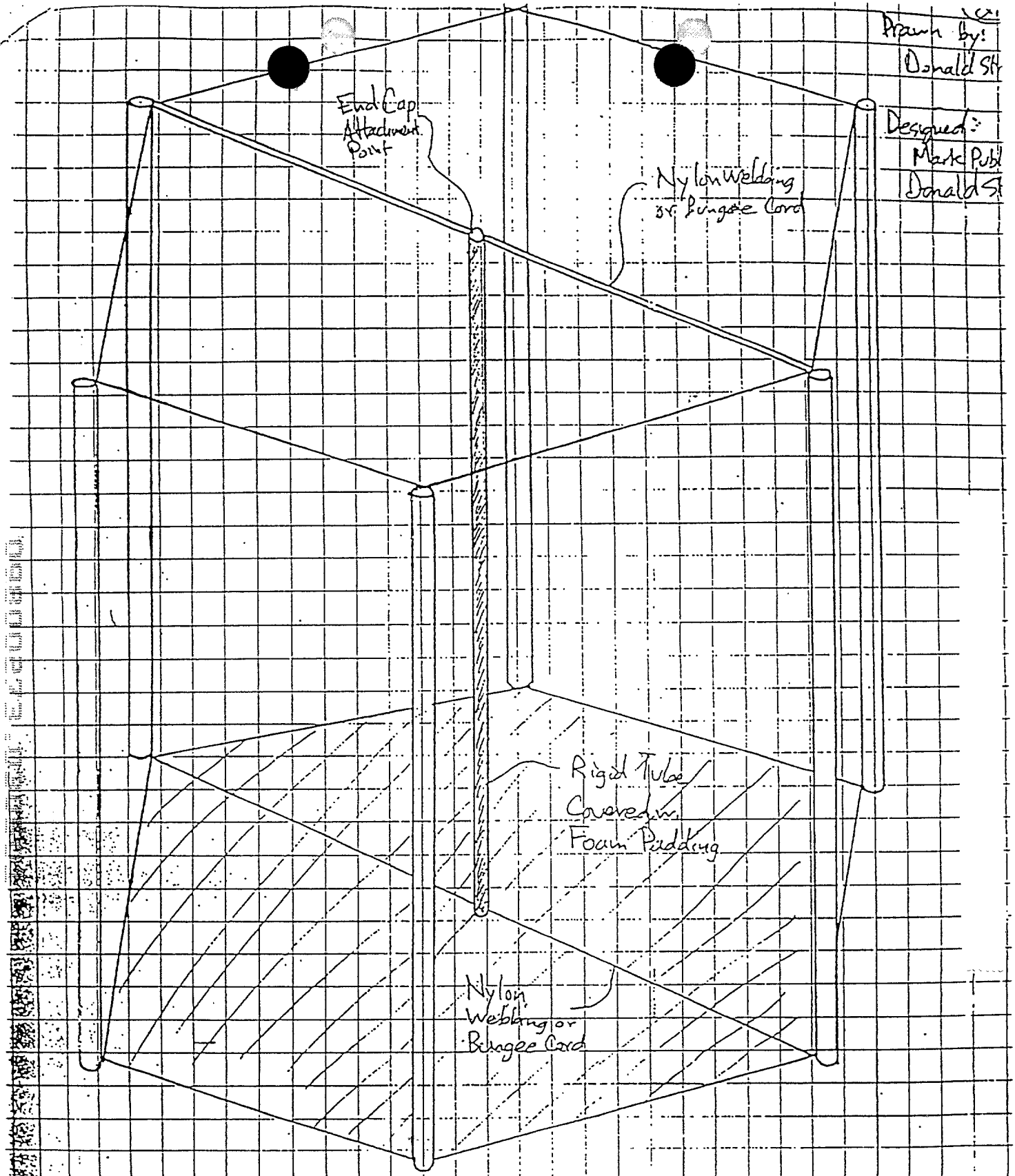


The screen may be made of a mesh, fabric or plastic sheet and may be transparent, semi-transparent, or opaque. The hooks and bands used to attach it to the poles are either plastic or some type of cord.

Games are played using the screen by passing a ball from one "cell" to another through the holes.

Drawn by:
Donald St

Designed:
Mark Pubi
Donald St



Purpose: To provide a mounting point for various games and play equipment

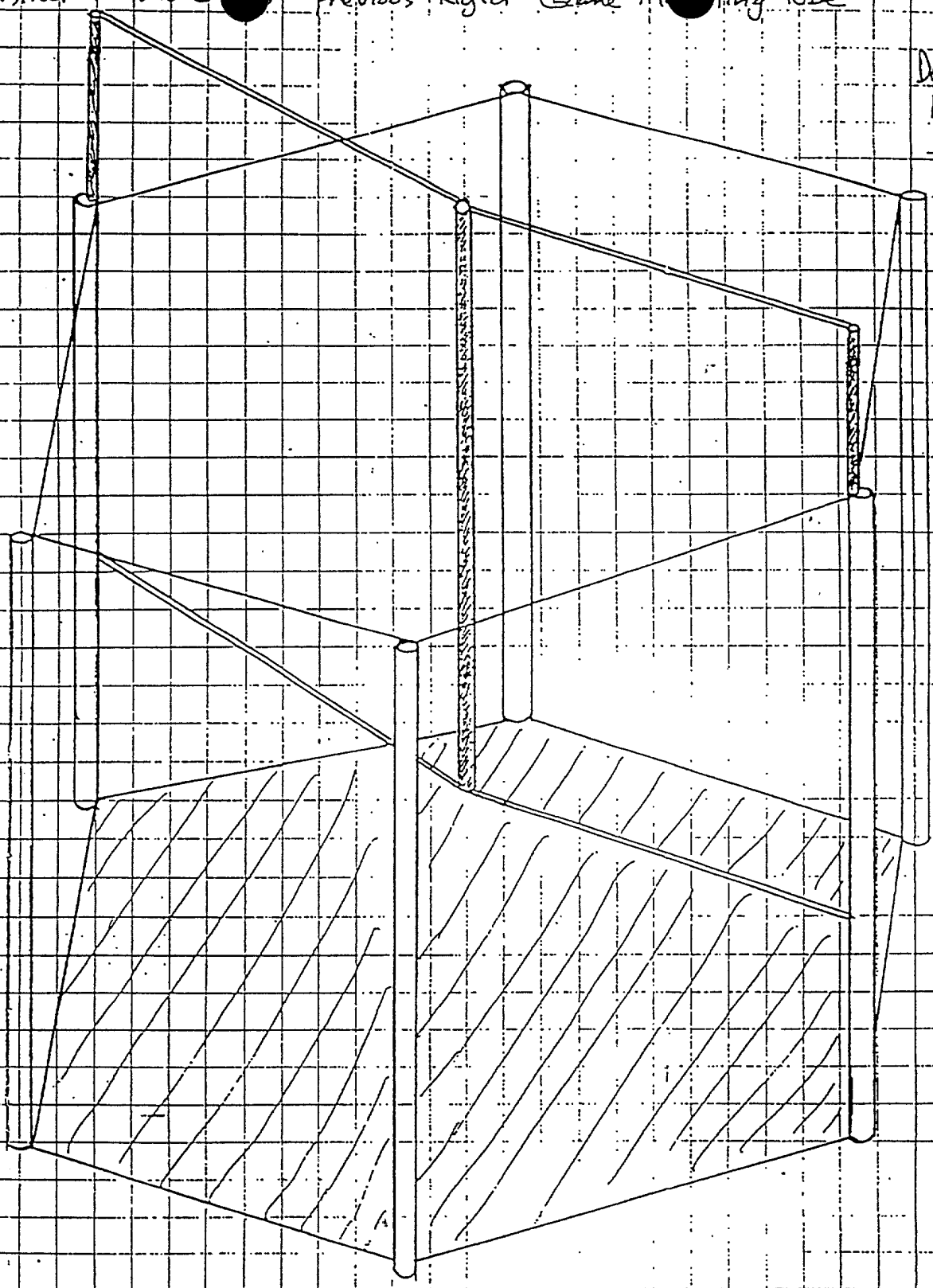
Materials: The tube is a rigid plastic, covered with a foam padding (probably polyethylene). The end cap is plastic (Nylon, HDPE, etc), and the top and bottom straps are either nylon webbing or elastic cord.

Purpose: Same as previous Rigid Game Mounting Tube

Construction: Same as previous Rigid Game Mounting Tube

Drawn by
Donald Sta

Designed
Mark Publ
Donald Sh



Novel Features: Mounting Tube is suspended above the bed surface so that they do not come into contact. This prevents the pole from moving violently up and down when users bounce on the trampoline.

EXPRESS MAIL EM171166139US
Deposited 7/9/97

7/9/97

Notes from Mark Publicover For the TrampolineCourt

- The width of the candy-striping straps which wrap around the padding and the poles and engage the bungee cord can increase or decrease the shock absorbing properties of the padding. This is because you are increasing or decreasing the surface area of the strapping. This is one way we can adjust or tune the jump court system to specific weights. You can also do this by using bungee cord with a different diameter to vary the stretch rate. The bungee cord runs from the top of the pole, interlaces the fence, and runs down to the base of the pole. You can also use the bungee cord to actually engage the net and wrap or candy-stripe up the pole, and not use webbing or strapping at all.
- The second thing you can do is to create an enclosure with a more elastic-type configuration. This would be done using netting which is either a diamond shape, or made from nylon cord. Both of these would provide more stretch, giving the enclosure surface better energy absorbing characteristics. This would get rid of the shock absorption afforded by the bungee cord. You could, of course, accommodate the extra elasticity of the nylon cord netting and a diamond pattern, with the bungee cord, and get the same effect by reducing the rigidity of the poles.
- We have considered the different types of poles that could be used. This includes different materials such as graphite-similar to those used in pole vaulting, kevlar, carbon fiber, fiberglass, and different types of plastics. All of these could be incorporated to basically tune the system for different weights and needs.
- There are several different types of bungee cords that may be used. Many different materials may be used for the sheathing, such as nylon, polypropelene, polyester, and other products which could be made to have a high UV resistance and would wear well in the outdoors in a variety of climates.
- The caps at the top of the poles have been designed so that they are rigid enough to prevent somebody from crushing it so that they would run into the tops of the poles. There are several products which could be used for this application. One of the things we could do is to decrease the rigidity and give the homeowner a little tube of foam or some kind of caulking that they would inject into the ball. This could be done either before or after it was installed. We could do that as a second operation or we could actually hand out little balls that could be crushed and pushed in through the neck of the cap. That would add to the ability of the ball to be a little more elastic, and yet still have some mass there to prevent somebody from crushing the cap and hitting the top edge of the pole.
- The caps are currently made of PVC. We can also vary the wall thickness of the cap and go with a 90 durometer and make a thinner wall thickness. We are currently involved in testing whether or not this type of cap would be crushable, yet still stiff enough to prevent somebody impacting the top of the pole from crushing the ball enough to come into contact with the top of the pole. There are hard styrene products

which would also work for this purpose. We are currently researching other materials that would maintain its physical properties over a wide range of temperatures.

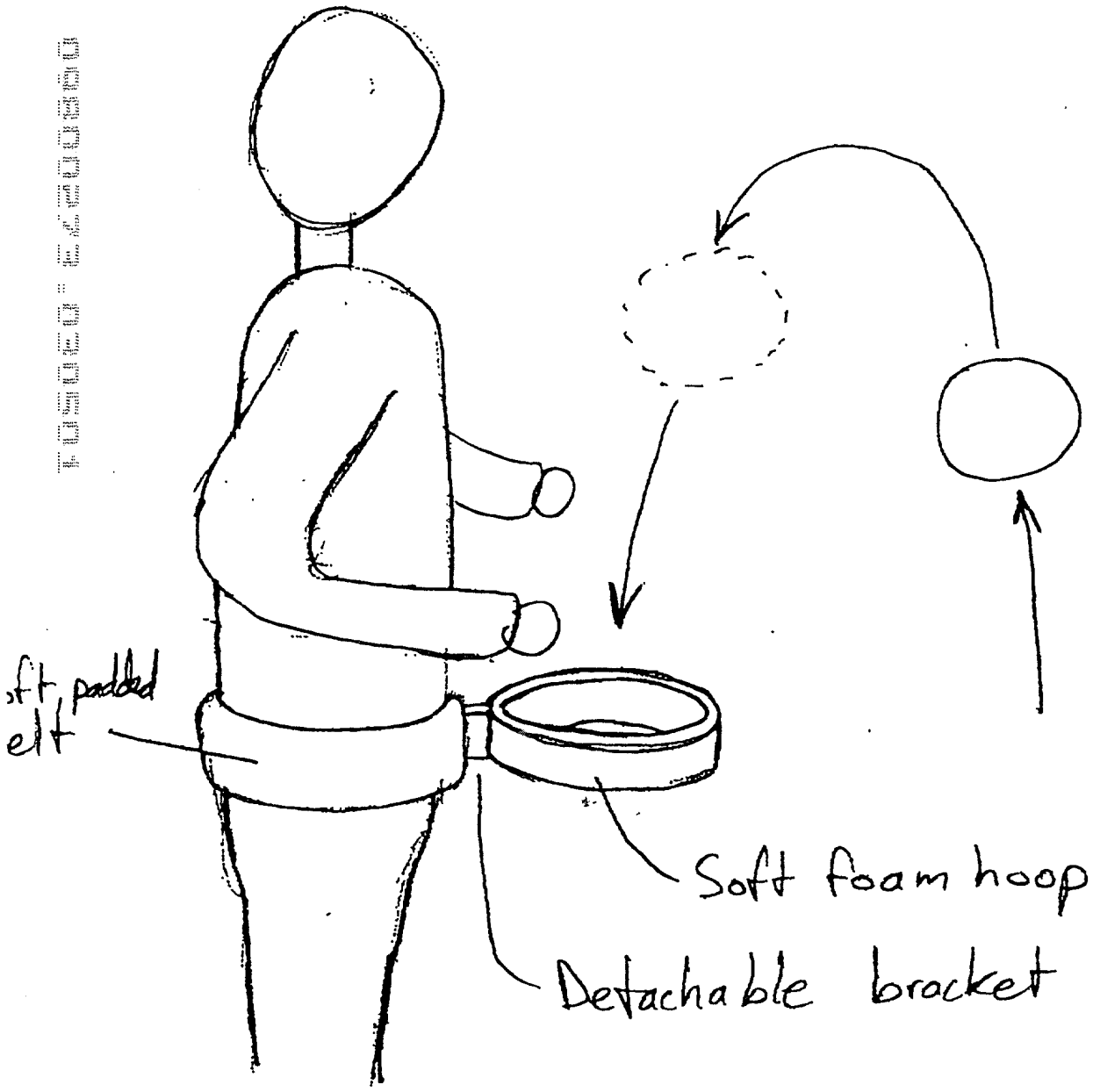
- The shock absorption capability of the system can be varied by the density of the foam padding around the poles. There are other products, such as plastic meshes, that have certain shock absorption properties which could be used to wrap the poles. The strapping could then be wrapped around those products.
- There are a number of ways to create the shock absorbtion capabilities that we are looking for. The most important, of course, is to vary the density of the foam being used.
- We have thought about the fact that we could create screw-type clamp-downs that could be used to hold the legs down, in a situation where you do not want the unit sliding or tipping at all. If there are heavyweight people using the unit, we would want some way of holding the legs down. We can accomplish that by attaching a screw-shaped piece of rod into the ground. This has been done for tents, and so forth. It would have a little round piece at the top that would be able to be adjusted and fit over the leg, or clamped to the leg. We could use a pipe clamp, or several different types of clamps. We could just run the screw shape through that and just clamp it down. Another option is to attach a very stiff bungee cord to the leg or to the trampoline bed and screw the screw into the ground. This would relieve tension and yet still serve the purpose of allowing the thing to tip a little bit, without letting it move. Another option is to put the screws inward, and have the bungee cord coming from the trampoline frame down to the screw. This would allow for some limited movement, and prevent any possibility of tipping over.
- The pads that are used on trampolines cover the circular frames of the trampolines and the springs. We have several improvements to the current designs. The foam should fill the entire sleeve that is sewn for the pads. Right now, the foam that manufacturers put in the sleeve is only 8" wide, whereas the sleeve itself is 12" wide. This creates 4" of slop in there, and where the pad can slip in toward the center of the trampoline. This exposes the circular frame of the trampoline. To prevent this from happening, we can use foam which is cut to fit snugly into the sleeve so that there is no room for movement. Secondly, we can use tubular foam padding to go around the circular frame of the trampoline. Most trampoline frames have an outer diameter of 1.92". We can use tubing with an inner diameter larger than that, such as a 3" inner diameter, and split them in half. These can be packaged with PVC tape, which is very weather resistant. This will be color coordinated to match the TrampolineCourt. The foam tubing can be attached to the circular frame of the trampoline by wrapping it with the PVC tape. This idea could be important in marketing our products, allowing the customer to have a safer, or "soft" trampoline.
- Another area for improvement in pad design is the problem of keeping pads in place. We can have each manufacturer make a pad that has holes punched in it, in the area where our court attaches to the legs. This would allow the pads to be pulled down in its proper position. The U-bolts would then be slipped through the holes in the pad skirt. The holes would be punched, and the area around them would be reinforced, so that it was quite strong, and then it would slip down quite nicely over the U-bolts. Then our trampoline pad would be attached to that. Another way to reinforce that area is to stitch in a bungee cord to attach the pad to the trampoline frame. Right now most

manufacturers stitch nylon webbing to the underside of the pads and have the user tie them around the trampoline frame. The problem with this is that these ties are immovable. When someone lands on the pad hard enough, the pad is pulled inward, away from the frame, and the webbing begins to rip away from the pad. This is a very common problem. Our design is to use an elastic system to attach the pad to the trampoline frame, thereby allowing the pad to move when it is hit, and preventing the attachment points from being ripped away. (Jumpking currently makes a pad with elastic attachment straps which are fastened by a nylon buckle)

- Another improvement to the pad is to use a PVC coating. This would be more expensive, but would hold up at least 3 times as long as the material that they are currently using. We could also use HDPE, or various roofing material such as Duralast as a colorized cover fabric for the padding. Because of its tremendous durability, it would hold up at least 3 times as long as the current materials. An additional idea is to create a cover without padding that we would sell to cover the manufacturer's padding. This would be made out of PVC, HDPE, or Duralast. It would be attached by bungee cords in a Z-type pattern running underneath the frame and springs of the trampoline. You would stitch an attachment point along one side of the cover, and lace underneath the trampoline from the spring-bed connection to the other side, where you would have another connection, and then back and forth around the trampoline. You could have a cord attachment that would run along the outer edge of the trampoline, and pulls together like a draw-string. Then there is an elastic inner connection that runs from the inner edge of the cover to the bed rings of the trampoline. Then you would have a simple cover, without padding, which would prevent deterioration of the manufacturer's pad. This would not have the additional cost of stitching in padding, and all that it entails.

Hip Hoop

Description - game is played with the "hip hoop" device, and one or more balls. User bounces on surface of trampoline, while attempting to control the bounce of the ball. The goal of the game is to bounce the ball through the hoop.



Water Jump Rope

Description – Unit sprays moving streams of water across trampoline. User attempts to jump over or duck under spray to avoid getting wet. Motion of the spray is operated by the water pressure from the hose.

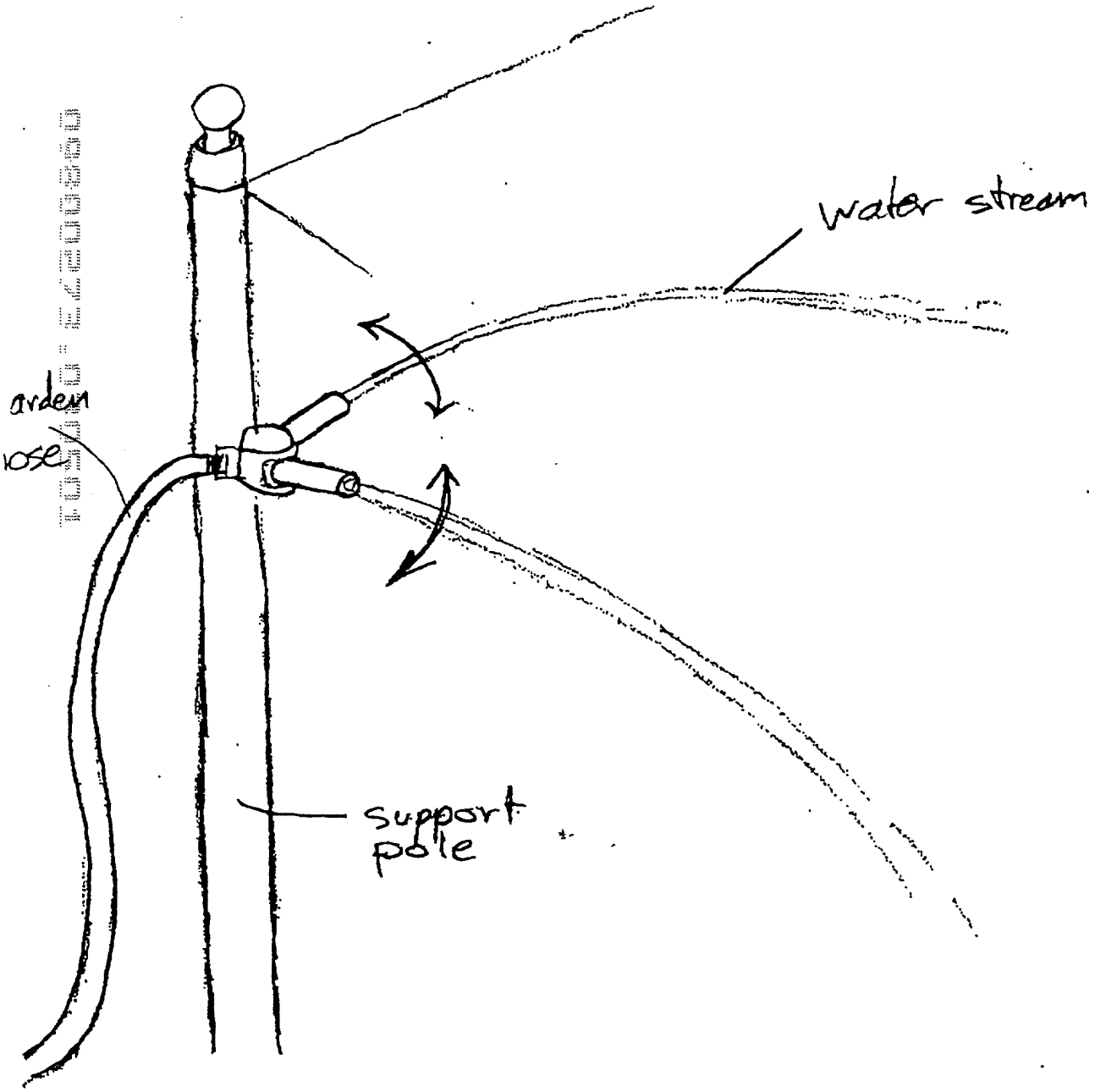
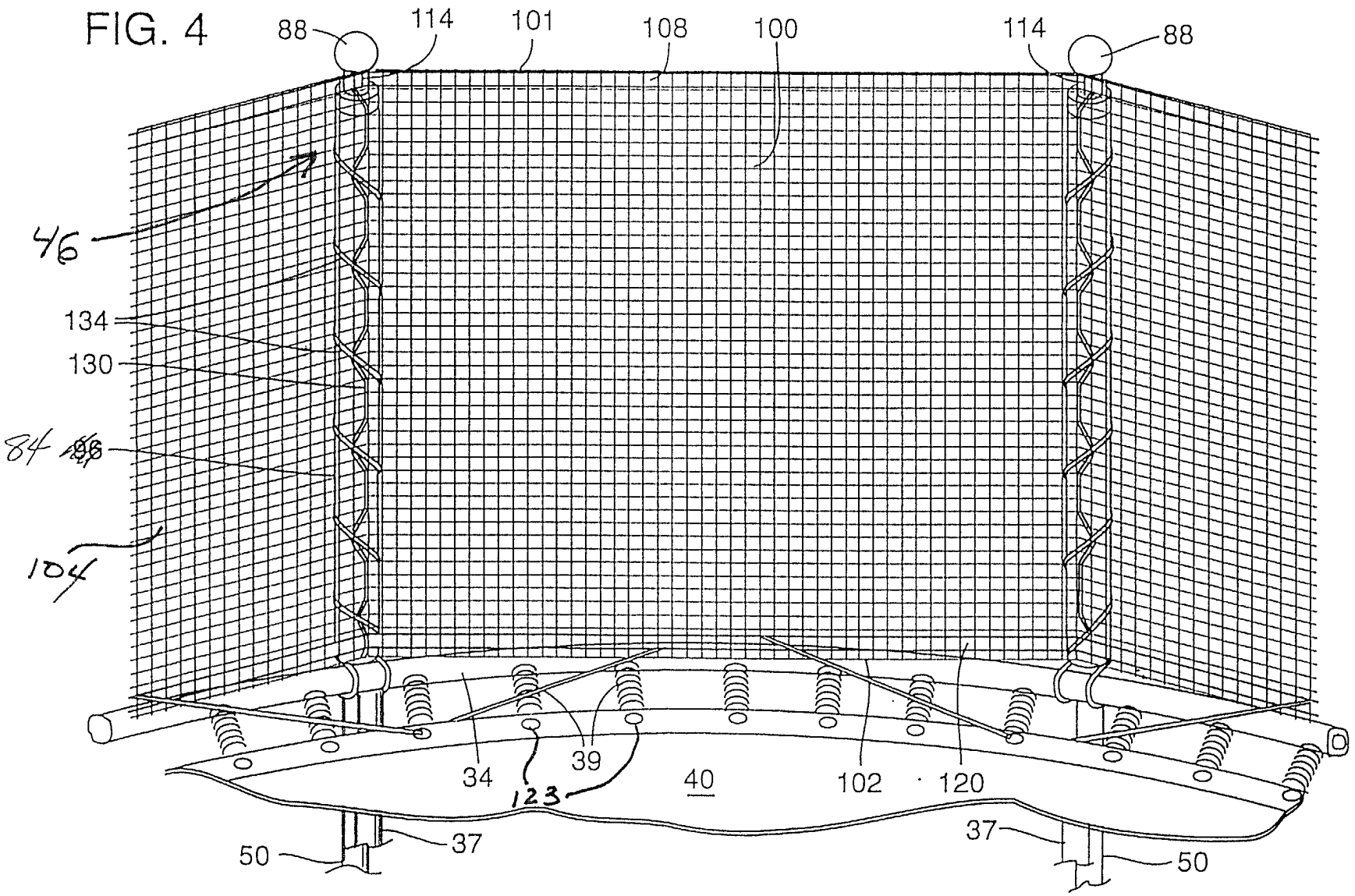


FIG. 4



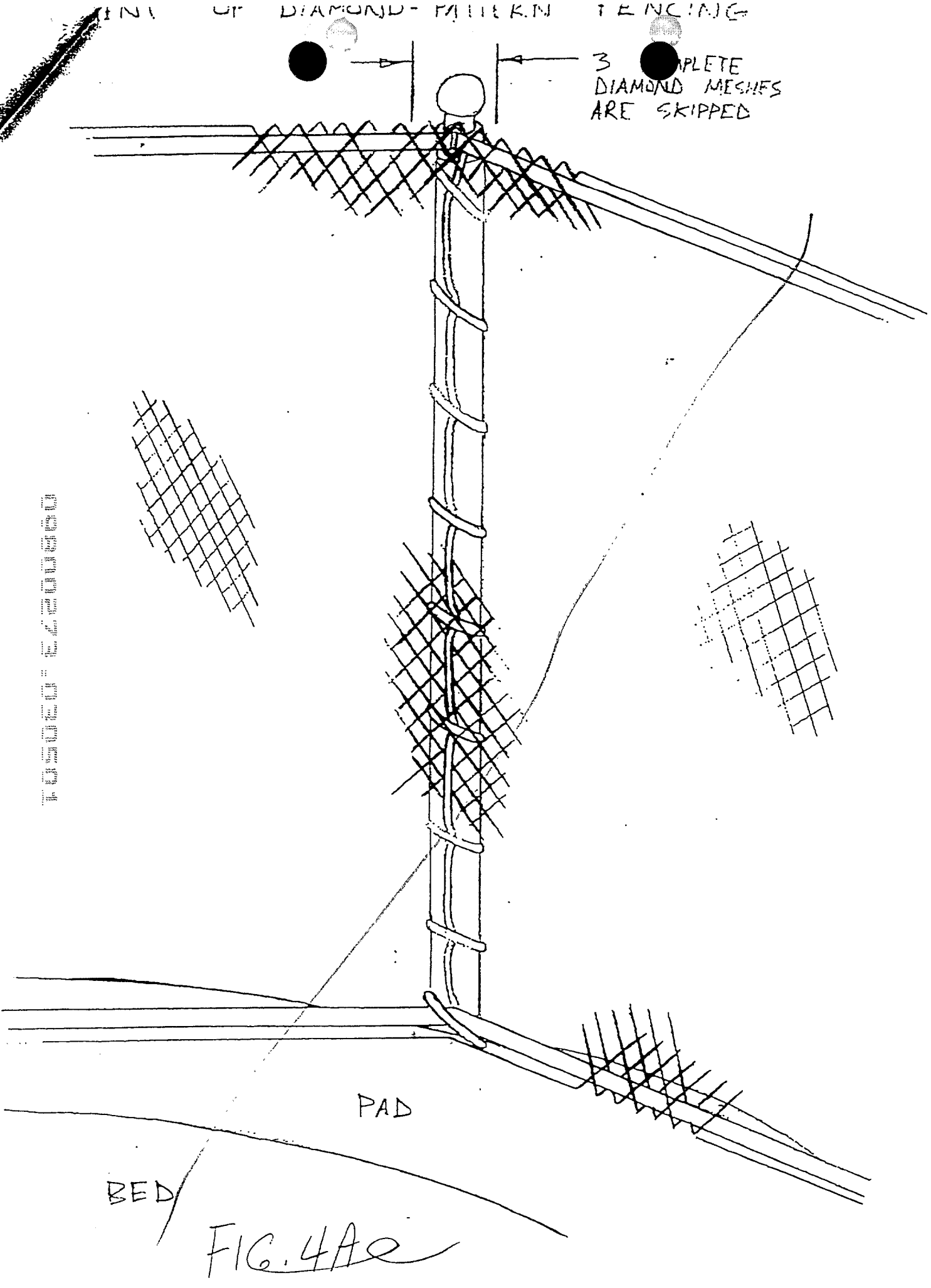


FIG. 4Ae

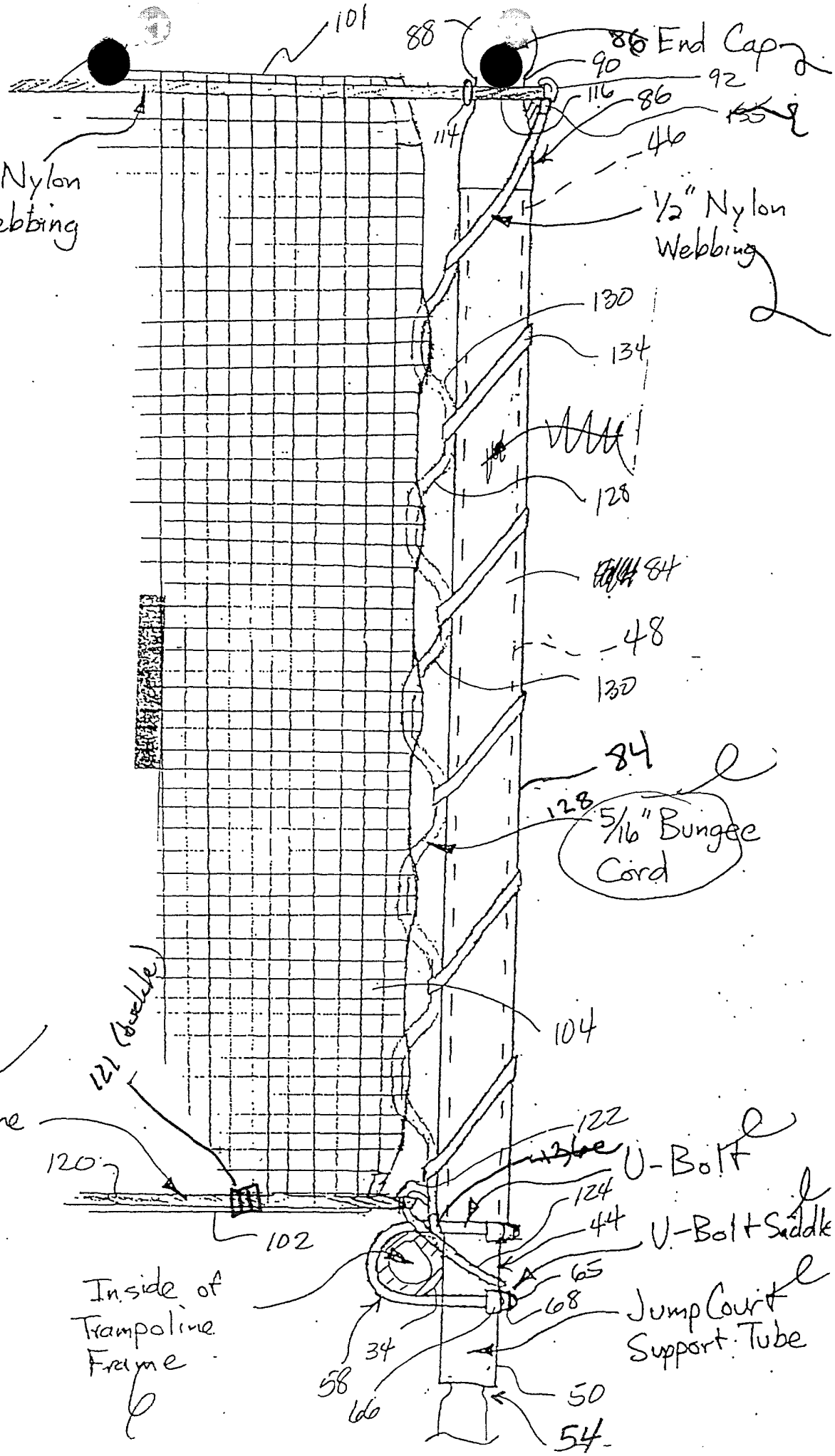
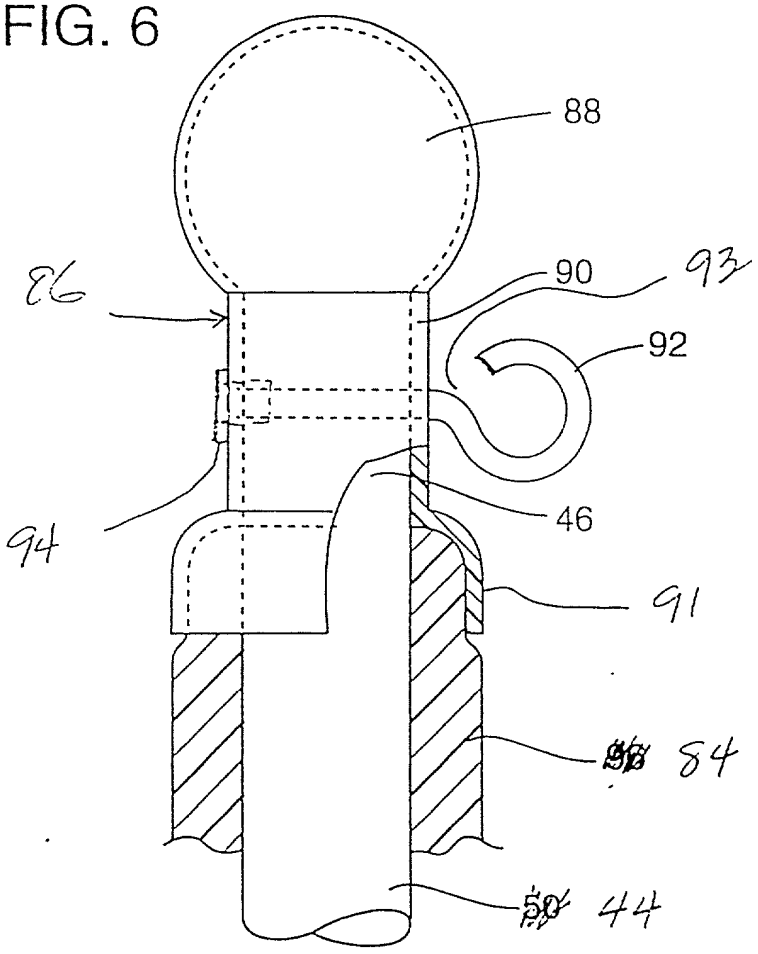

101
88
86 End Cap
90
92
116
86
114
46
1" Nylon Webbing
½" Nylon Webbing
130
134
128
84
48
130
84
128
5/16" Bungee Cord
104
121 (double)
1" Polypropelene Webbing
120
122
U-Bolt
124
44
U-Bolt Saddle
102
65
68
Jump Court Support Tube
Inside of Trampoline Frame
34
58
66
50
54

FIG. 5

FIG. 6



nment of el c cord to pole cap!

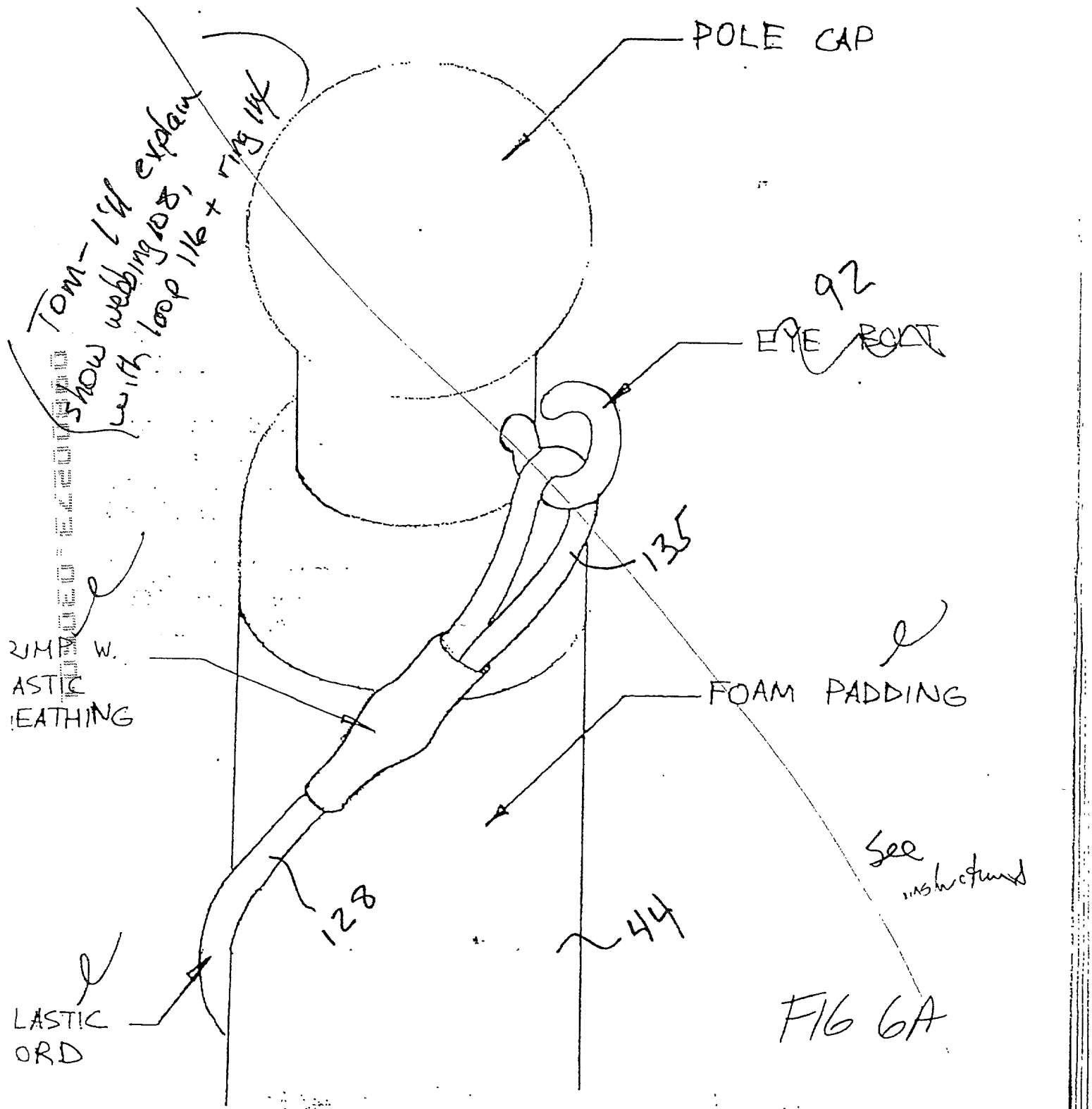
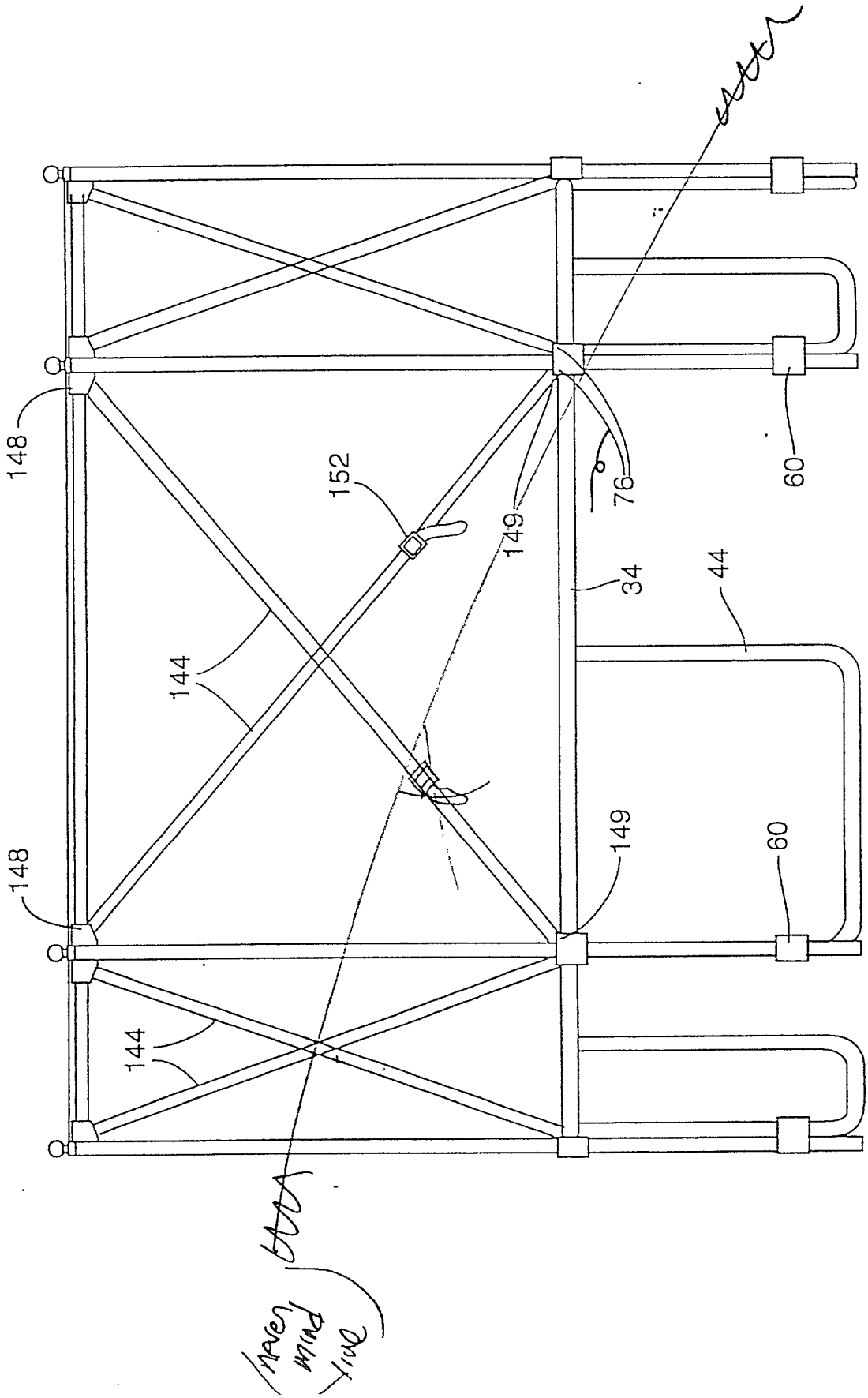


FIG 6A

FIG. #2



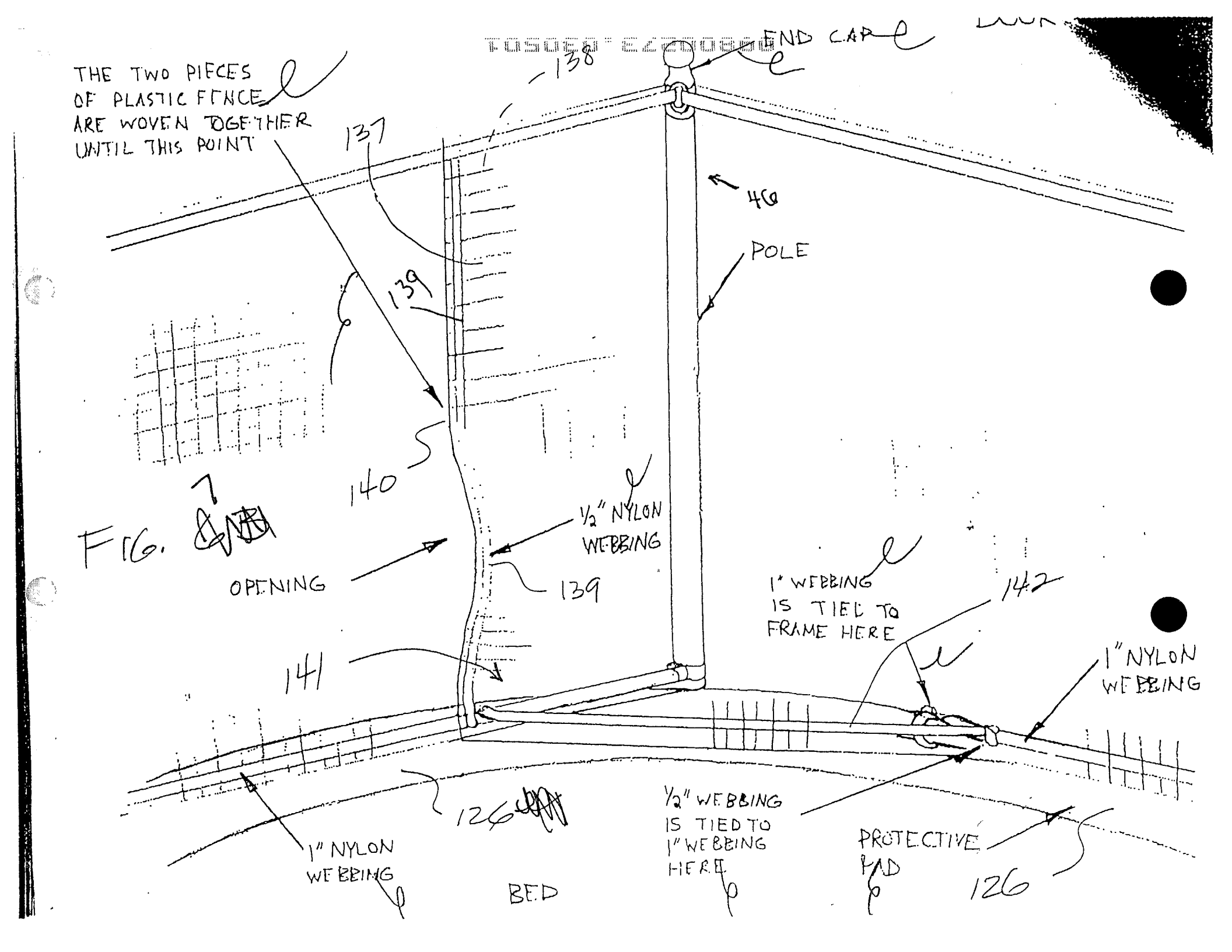

THE TWO PIECES OF PLASTIC FENCE ARE WOVEN TOGETHER UNTIL THIS POINT
138
END CAP
137
46
POLE
139
140
1/2" NYLON WEBBING
OPENING
139
1" WEBBING IS TIED TO FRAME HERE
142
141
1" NYLON WEBBING
126
1" NYLON WEBBING
1/2" WEBBING IS TIED TO 1" WEBBING HERE
PROTECTIVE PAD
126
BED

FIG. 7

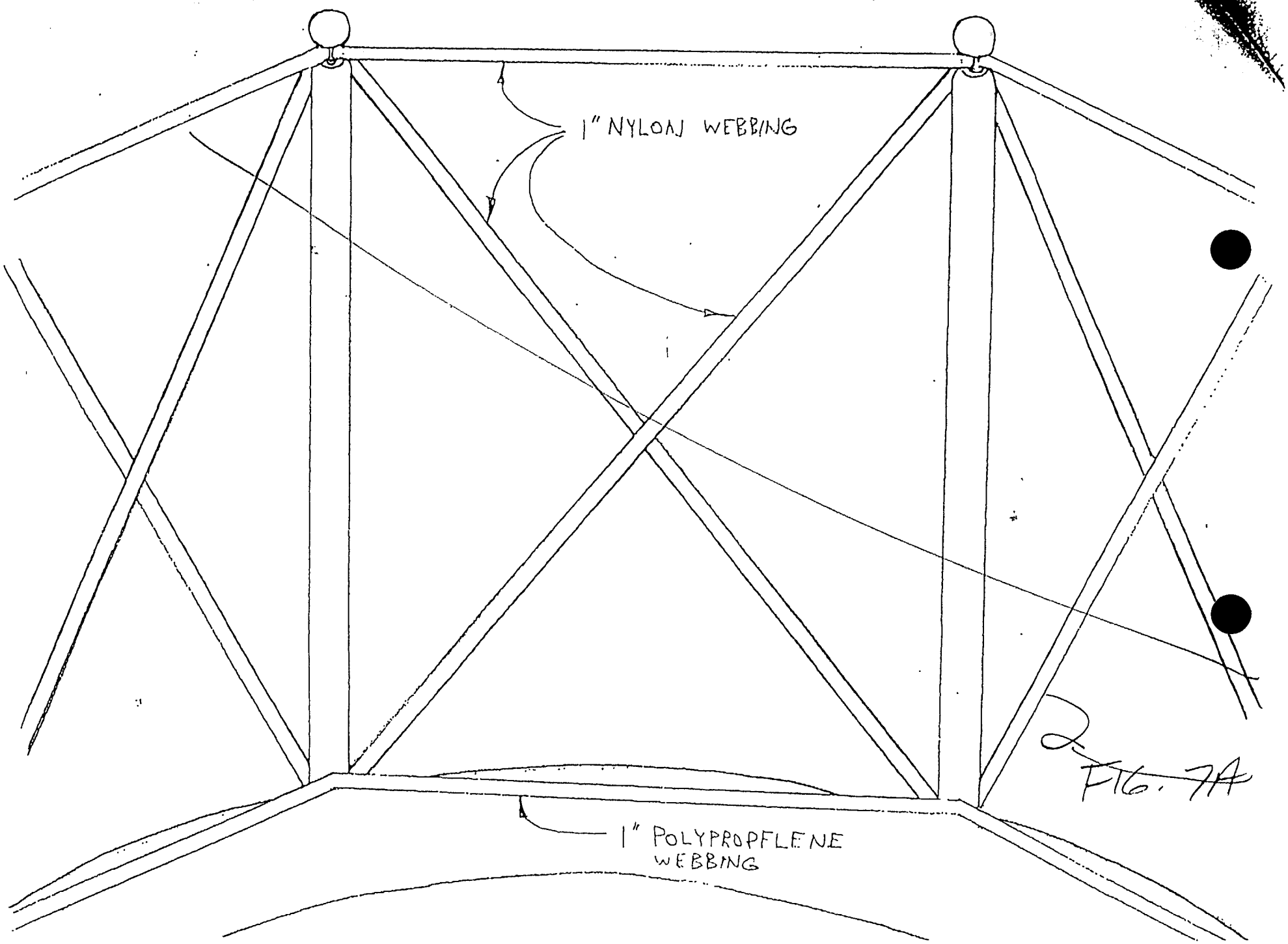


FIG. 7A

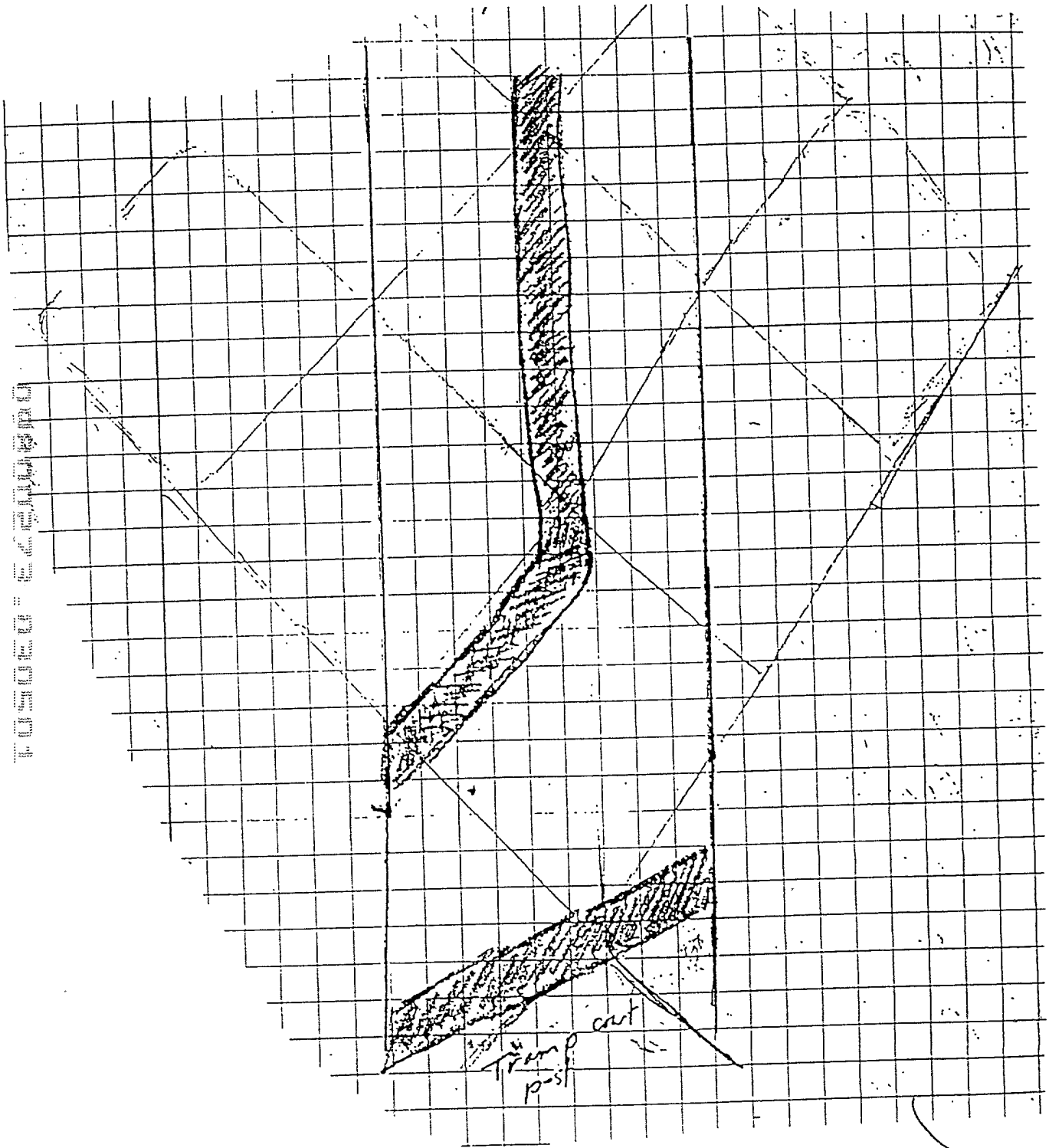


FIG. 9e

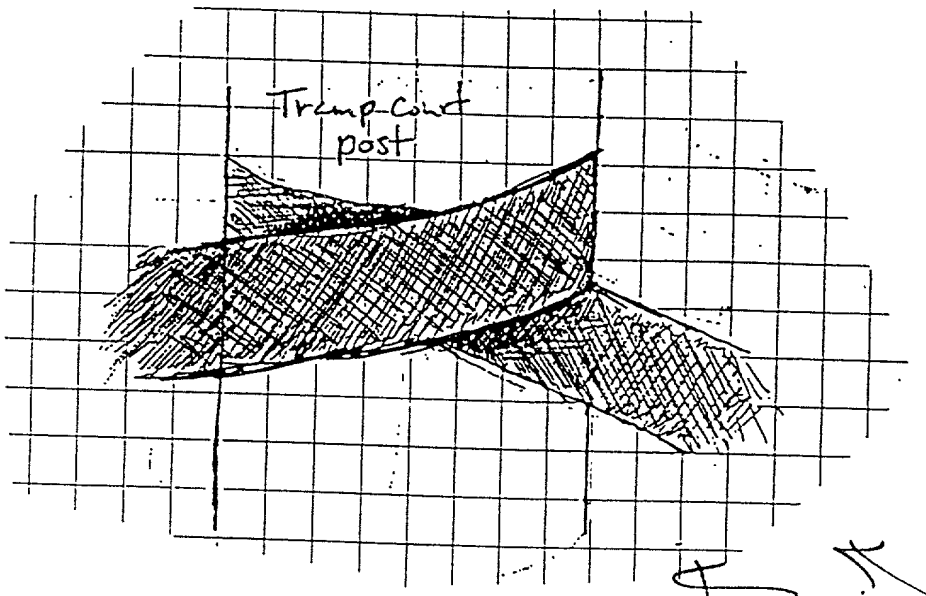


Fig. 9

~~Fig 8~~

show wrap webbing in neck ~~86~~ 90 of end cap 86 (see Fig. 6)

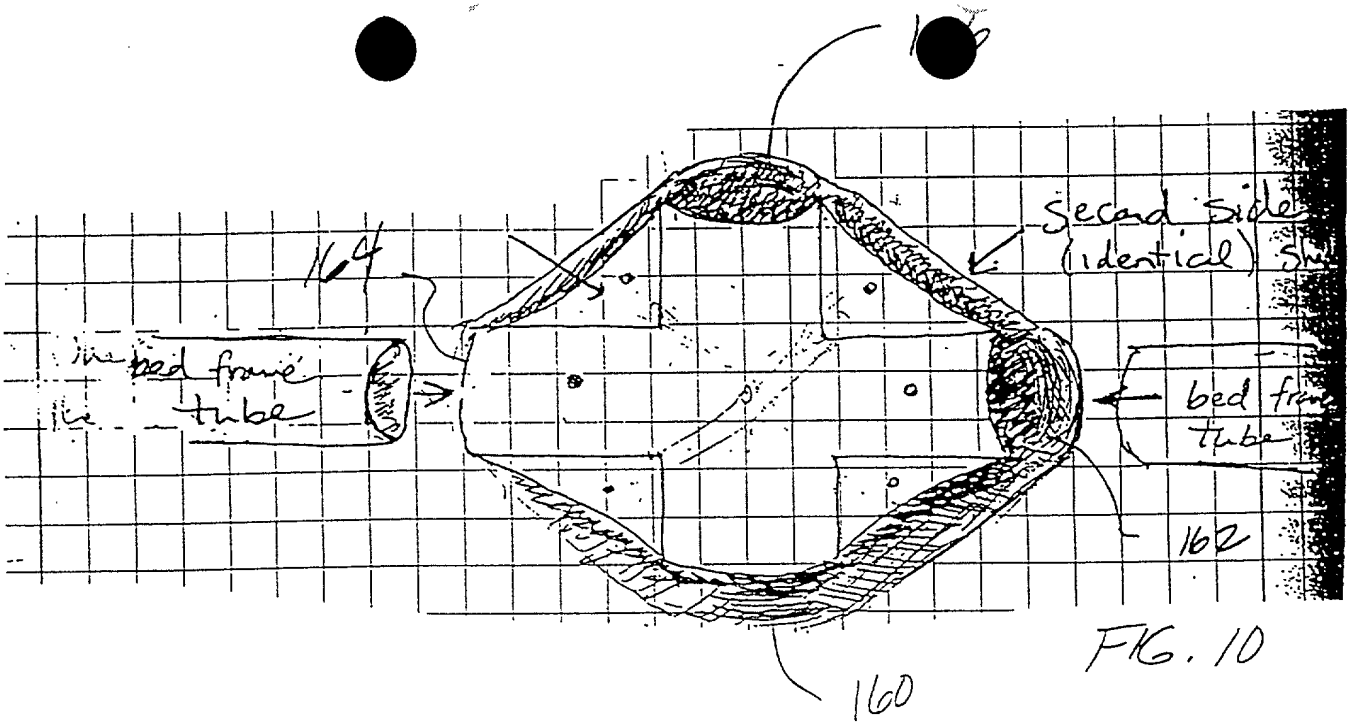


FIG. 10

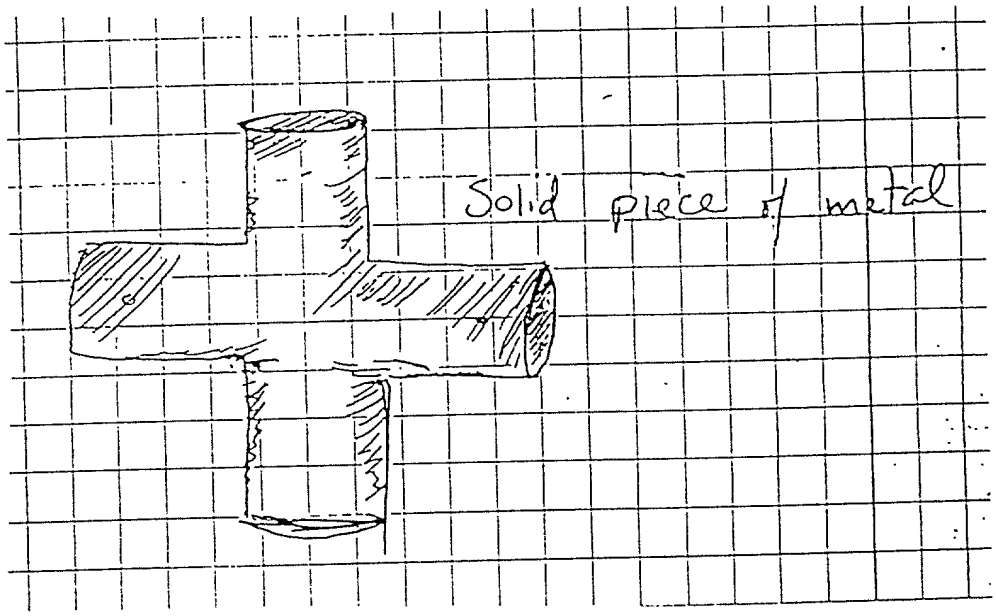


FIG. 11

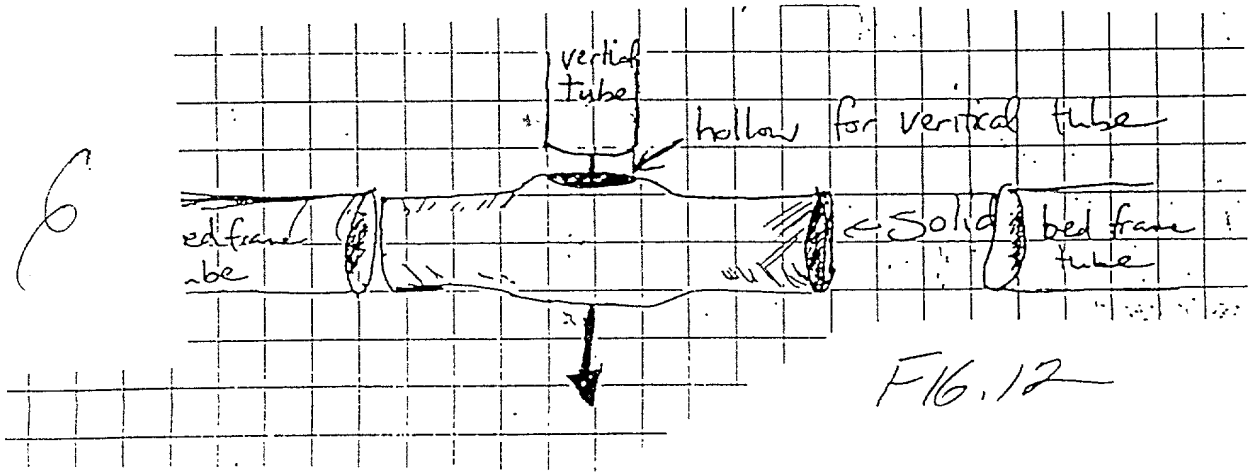


FIG. 12

Bed Switch

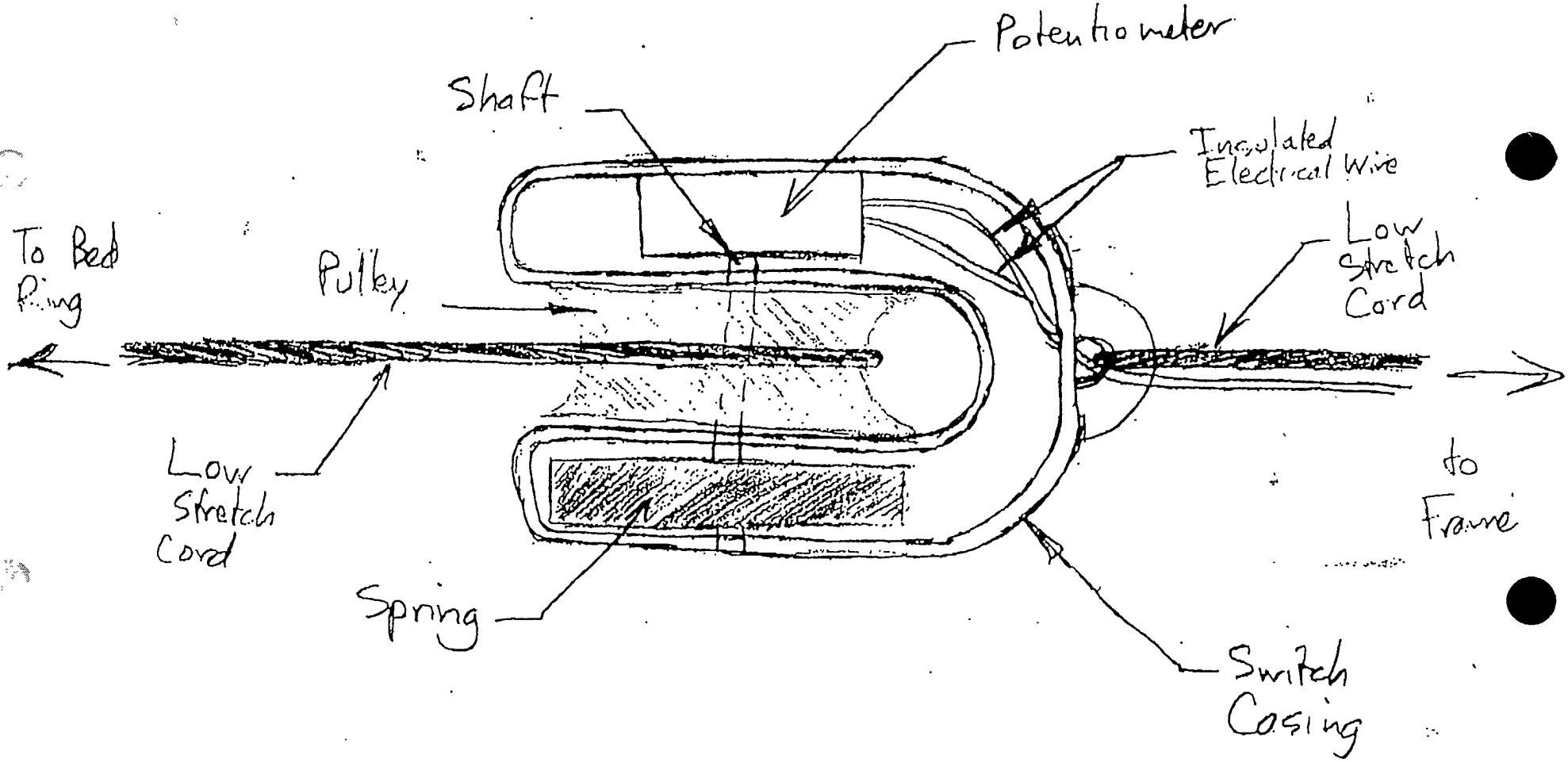


FIG. 13

Bed Switch

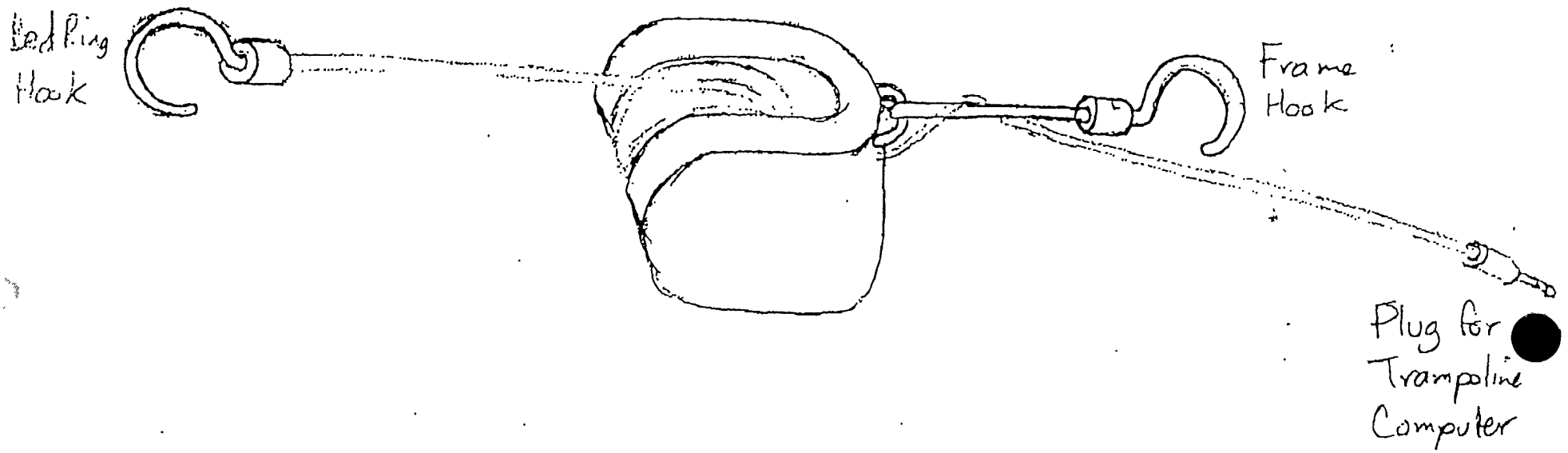


FIG. 14

The JumpCourt system can be tuned for different demand uses. Through engineering calculations it has been possible to generate minimum and maximum parameters for choosing the spring rate of the poles in relation to various versions of the JumpCourt system. The poles should be viewed as long tubular springs attached to an elevated diaphragm that also disperses, absorbs, and re-cycles the impact forces directed at the poles. The diaphragm also transfers these forces to the support system that maintains the diaphragm's elevation. The poles or tubular springs can be loaded by tightening the top strap which would push/pull the tubular springs downward and inward. This would make the JumpCourt system tighter/less flexible so that the impact forces from a focused strike point would transfer more quickly to the entire system than would be the case if the top strap were loosened, unloading tubular springs and allowing them more space to flex, thus delaying transfer time and making any impact with the net feel "softer" which would be better for lighter individuals. Loading the poles/tubular springs in this way works on the same principle as loading a bow for the purpose of shooting arrows. Another novel feature, when the poles begin to fatigue over time the top strap may be tightened to compensate for this increased flexibility and the net may be adjusted or trimmed (depending on the version of the JumpCourt and the net/woven fabric material used).

Poles can also be mounted inside the circumference of the frame making it easier to install the JumpCourt system where space is too limited for exterior mounted poles. This change however has little or no effect on the way the does system was designed to manage the forces of impact.

The net may be suspended on the inside or outside of the poles. The straps and shock cords that are wrapped around the foam and inline with it are not necessary when the net is installed outside the poles. Of course the top/bottom straps may still be tightened to load the tubular springs/poles, and the foam padding which surrounds the poles still acts like a shock absorber for the net which constitutes another novel feature. For example, an impact to the net at one spot would tension it around its entire circumference compressing the foam padding on all poles. The net may also be suspended inside one pole and outside the adjacent poles or in any other in/out configuration depending on the desired impact absorption qualities being sought-after in a particular JumpCourt design.

The trick to designing the JumpCourt system with poles/tubular springs connected at top with a flexible inelastic, semi elastic, or elastic top strap was to engineer it so that the impact forces transferring to the trampoline frame did so in a manner which took advantage of the structural strengths of the trampoline in its entirety.k None of the other artwork shows this kind of impact forces management system. For instance, if any impact to the net occurred at a midpoint between two poles and the top and bottom of the net, only the JumpCourt system could respond in the following manner. The tops of the poles/tubular springs are allowed to flex downward toward each other, toward the area of impact. This loading of tubular springs works on the same principle as loading a bow for the purpose of shooting arrows. This effect makes it possible for the JumpCourt system to conserve more of the impact force energy in the poles/tubular springs enabling the system to more efficiently re-cycle this energy back into the impacting body for the purpose of returning it to the trampoline surface. None of the other artwork cited which shows a safety fence connected to an elevated diaphragm demonstrates the ability of the poles to flex downward and toward each other at the same time and this is a signlficant difference between the art. Because the tops of the poles/tubular springs are connected by a flexible cord they are not as limited in their range of motion as would be the case if they were connected by an inflexible cord. This additional freedom of movement in the poles enables the net to more completely conform to the surface of an impacting body, distributing the forces of impact over a larger surface area on the body which reduces the likelihood of injury.

APPENDIX D

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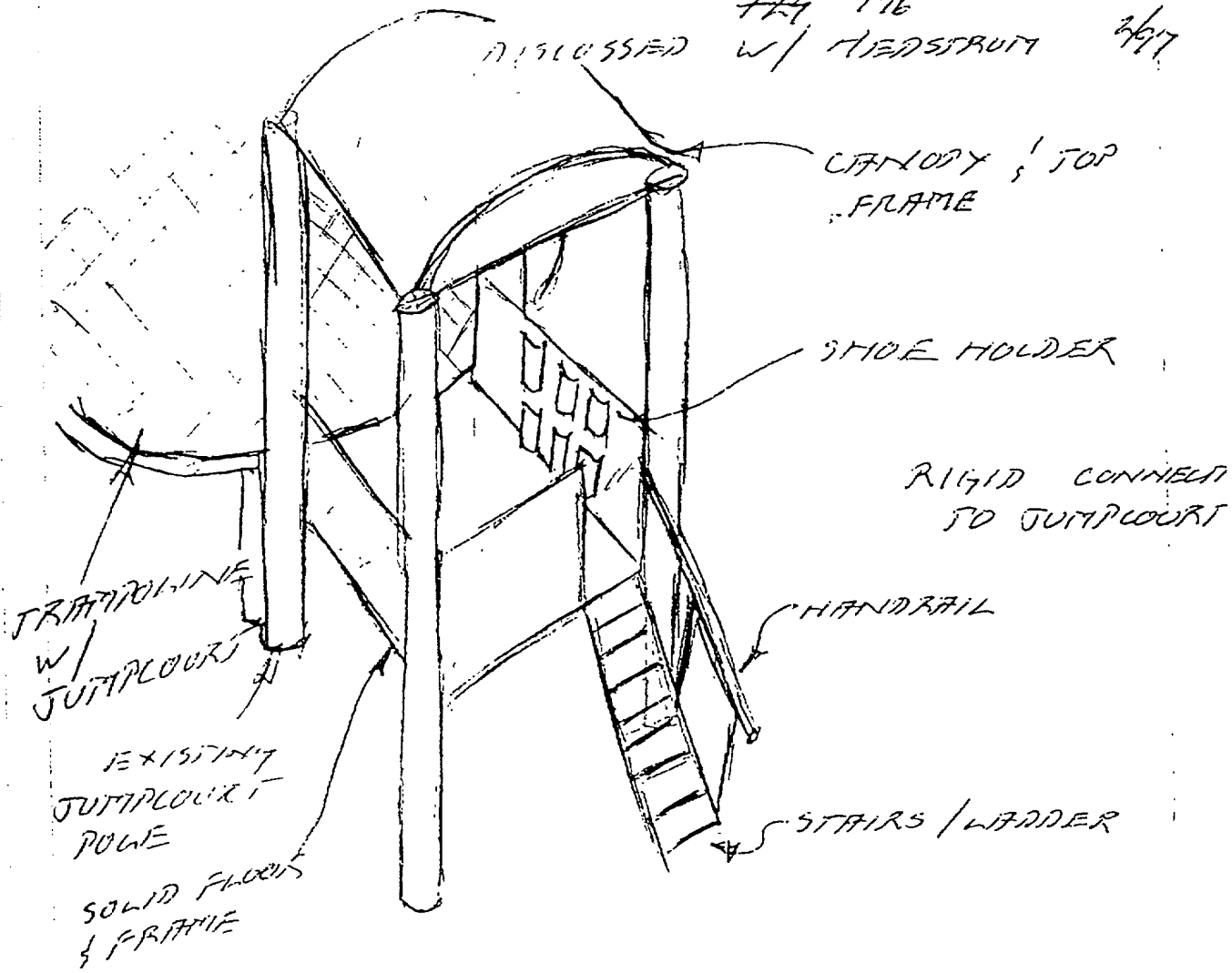
3/26/96 PLAY STRUCTURE

CONCEIVED BY MARK PUBLICOVER 3/96

DISCUSSED W/ MEDSTRUM 3/97



TO PROVIDE A TRANSITION STRUCTURE FOR ADJUSTING "SEA LEGS" WHILE MOVING TO & FROM TRAMPOLINE, REDUCING SPRAINS, FALLS, ETC.

STABILIZES, COUNTER-BALANCES & ANCHORS TRAMPOLINE & JUMPCOURT, STIFFENS & CONSTRAINS TRAMPOLINE FRAME TO PREVENT METAL-CHIPPING OF FRAME

6/1

JUMPSPORT w/ SLIP-FIT POLES
CONCEIVED, DISCUSSED BY MARK PUBLICOVER, TOM LYNCH (ALLIED STEEL) 12/15/97 (REF PERSONAL NOTEBOOK)

SWAGE JOINT ON STEEL POLES NOW REPLACED WITH SLIP-FIT JOINT

- INCREASED WALL THICKNESS AT HIGH-STRESS POINT, REDUCING STRESS LEVEL

- REDUCED PACKAGING SIZE BY PACKAGING UPPER POLE INSIDE LOWER POLE INSIDE FOAM PADDING. PADDING PROTECTS SURFACE FINISH OF LOWER POLE EXTERIOR. SLIP-FITTING POLES REDUCES PACKAGE SIZE (& SHIPPING COSTS), REDUCES CRUSHING OF NON-STEEL PARTS (EG VIDEO TAPE), REDUCES MATERIAL MOVEMENT AND USE OF PACKAGE INSERTS. SLIP-FITTED POLES STIFFEN BOX, ALLOWING LIGHTER BOX MATERIAL W/ LESS REINFORCEMENTS, PREVENTS STACKED BOXES FROM CRUSHING LOWER BOXES. FOAM PADDING FRICTION FIT AGAINST LOWER SUPPORT TUBE PREVENTS TUBE MOVEMENT IN PACKAGING & SUBSEQUENT PUNCHING OUT OF BOX END.

- POLES ARE (PARTIAL) ASSEMBLED ALLOWING CONSUMER TO PREVIEW POLE ASSY.

- SLIP-FIT BECOMES QUALITY INSPECTION, MAKING SURE POLES SLIP-FIT IN PACKAGING BEFORE [illegible]

- CAPS FITTED MALE-FEMALE SINGLE STACK TO REDUCE PACKAGE SPACE.

- SLIP-FIT ALLOWS TUNING OF SPRING CHARACTERISTICS BY REDUCING ~~OF~~ CANTILEVER LENGTH. ALSO ALLOWS ATTACHMENT TO SHORT-W TRAMPOLINES BY INCREASING SLIP-FIT.

-1178

JUMP COURT GAMES - MARK NOBLI COVER & BARRE DA

PLAYING SURFACES, SUSPENDED BY BUNGEE CORDS, OVER ELASTIC JUMPING / PLAYING SURFACE

GAME PLAYING SURFACE

JUMPCOURT POLE (SHOWING ONLY 2 OF 8)

BUNGEE CORD (TYP)

TRAMPOLINE

ALTERNATE GAME PLAYING SURFACE CONFIGURATIONS

SIDES EXTENDED BY TENSION OF BUNGEE CORDS

SOLID POLYGON

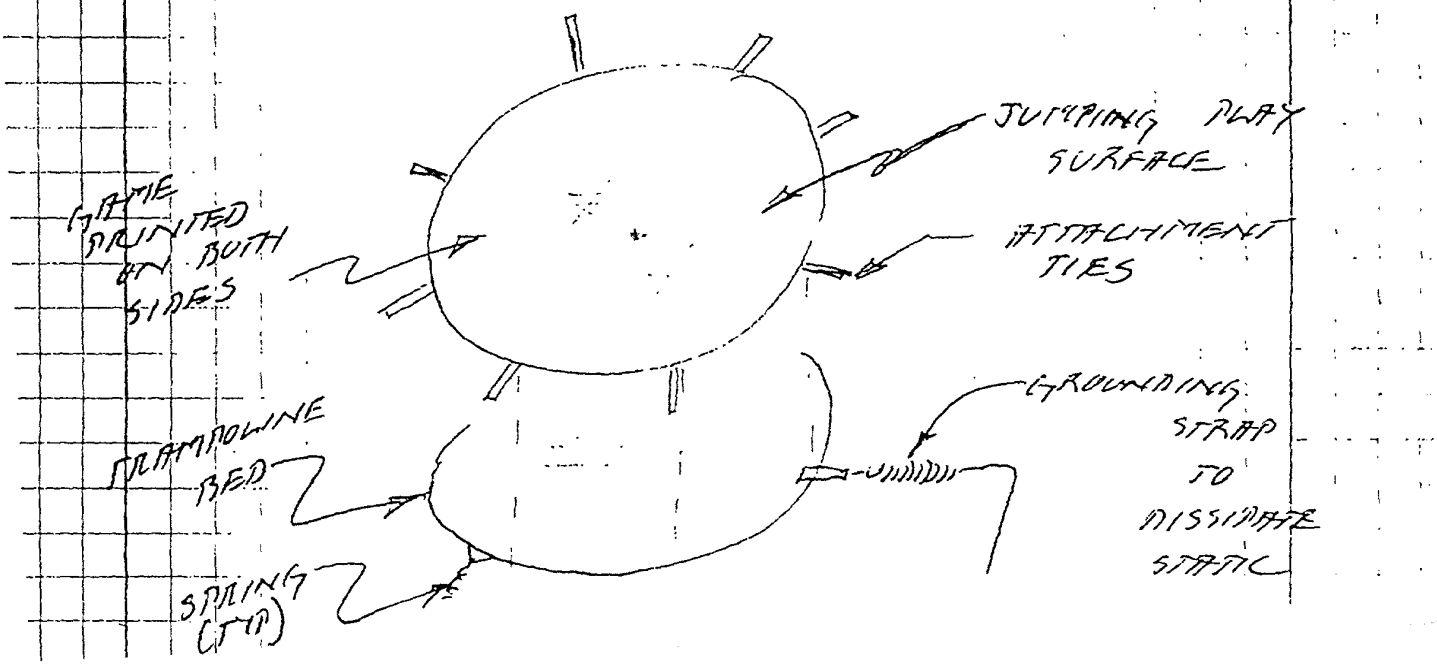
GETS SHAPE FROM SEWN-IN PLASTIC WIRE IN SPIRAL PATTERN

GAMES UTILIZE FABRIC (SMOOTH AND/OR MAPPED) SURFACE FOR STRUCTURED NON-ACROBATIC ~~GAME~~ ACTIVITIES, COMBINING EYE-HAND AGILITY WITH JUMPING / BOUNCING ON A JUMPING SURFACE

"PRE-SCHOOL PAK" CAN COMBINE ABOVE WITH EDUCATIONAL DIRECTION (LEARNING TO TELL TIME ON A CLOCK FACE, NORTH-SOUTH-EAST-WEST, NUMBERS, COLORS, ANIMALS, MATH ...)

GAMES REQUIRE JUMPING ON OR JUMPING TO REMOVE OR PLACE JOY MARKERS AS THE ANSWER, OR AS THE PLAYERS RESPONSE ("MOVE") IN THE GAME. GAMES COULD INVOLVE PLACING A MARKER TO TELL OR ILLUSTRATE A STORY.

JUMPING SURFACE GAMES

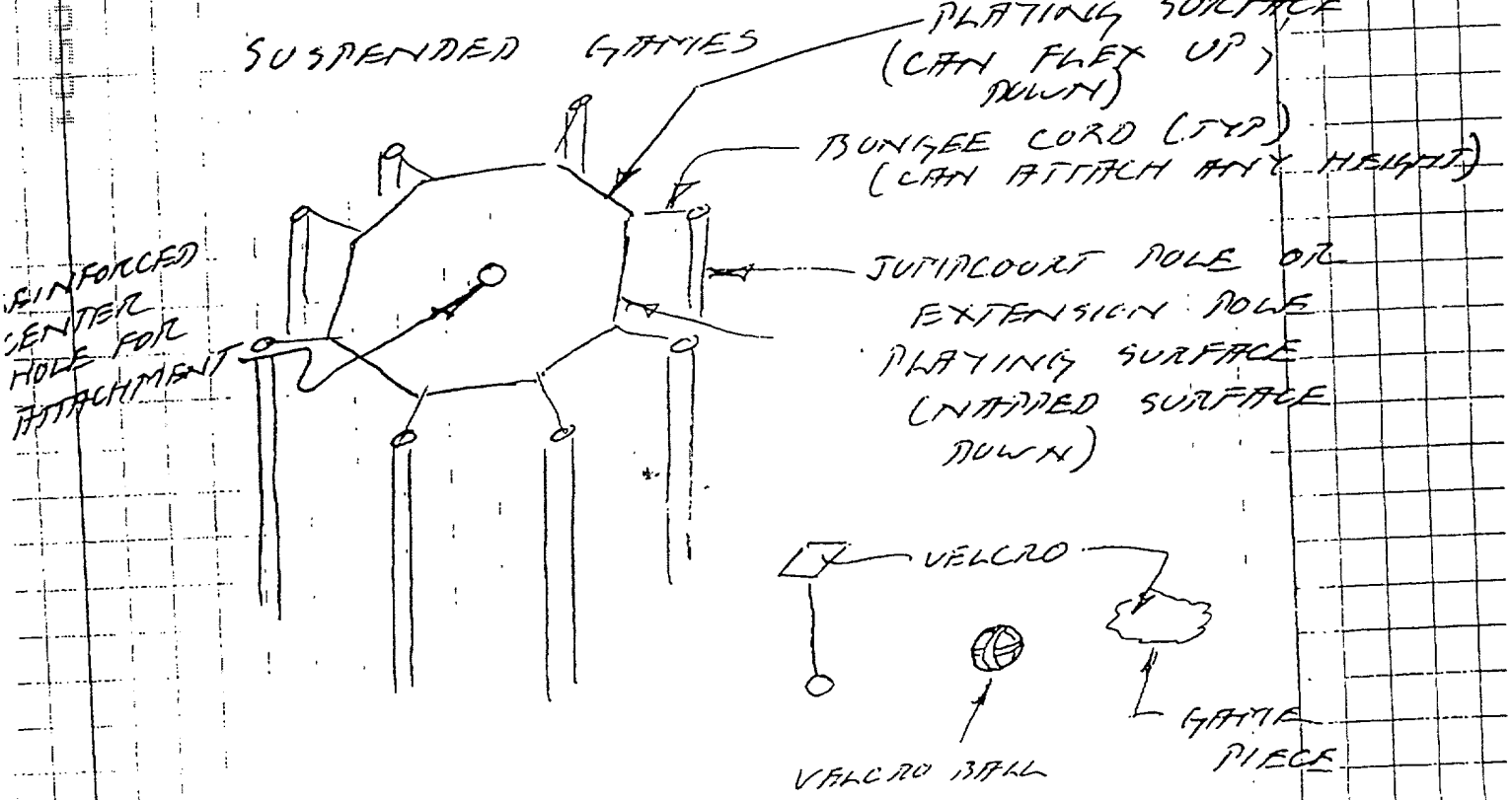


STATIC ELECTRICITY DISSIPATION CAN BE THROUGH GROUNDING STRAP, CONDUCTIVE COATING, STATIC GROUNDING STRAP, OR USE OF LUBRICANT (WATER, BABY POWDER, ETC) BETWEEN BED & PLAYING SURFACE

GAME PIECES MAY BE MAGNETICALLY OR VELCRO ATTACHED (HOOK FASTENERS ON GAME PIECES, NAPPED SURFACE ON GAME PLAY SURFACE)

ATTACHMENT TIES (BUNGEE, VELCRO OR FABRIC) ARE JUMPING SURFACE TO EXISTING TRAMPOLINE-TO-SPRING CONNECTIONS/LOOPS.

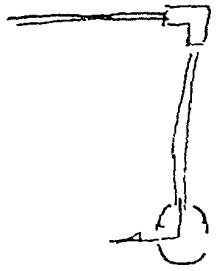
SUSPENDED GAMES

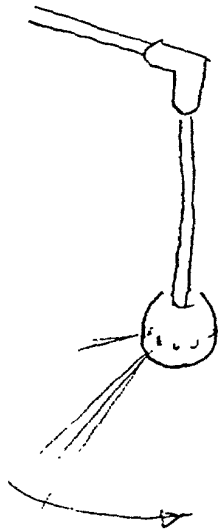


WATER - STREAM TOYS

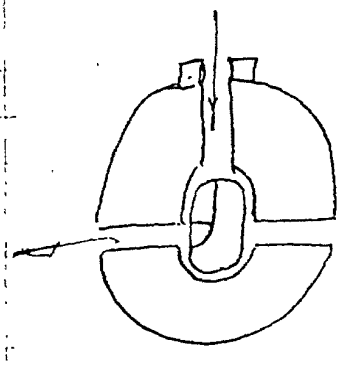
USING WATER STREAM, FROM SINGLE OR MULTIPLE JET HEAD WITH SELECTABLE SPRAY PATTERNS, FOR JUMPING GAMES.

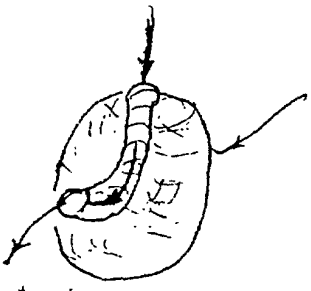
WATER SPRAY WILL OSCILLATE FROM FIXED OR MOVING POSITION, WITH CONSTANT, VARYING OR INCREASING ROTATION RATE. FLOW RATE INCREASES ROTATION RATE, OR ROTATION RATE INCREASES INCREMENTALLY WITH EACH ROTATION (CLOCKWORK MECHANISM)



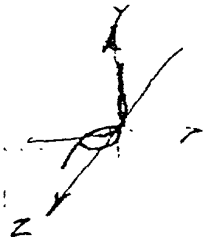


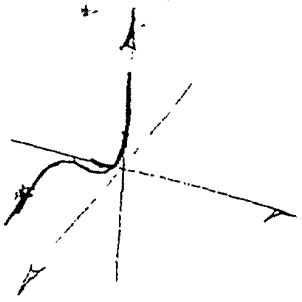
WATER SPRAY ROTATES OR RANDOMLY SELECTS SPRAY MODE





ROTATING SELECTOR IMPELLER (FLOW COMES IN FROM Y AXIS, EXITS IN X-Z PLANE OFF-AXIS TO PROVIDE ROTATION OF IMPELLER)





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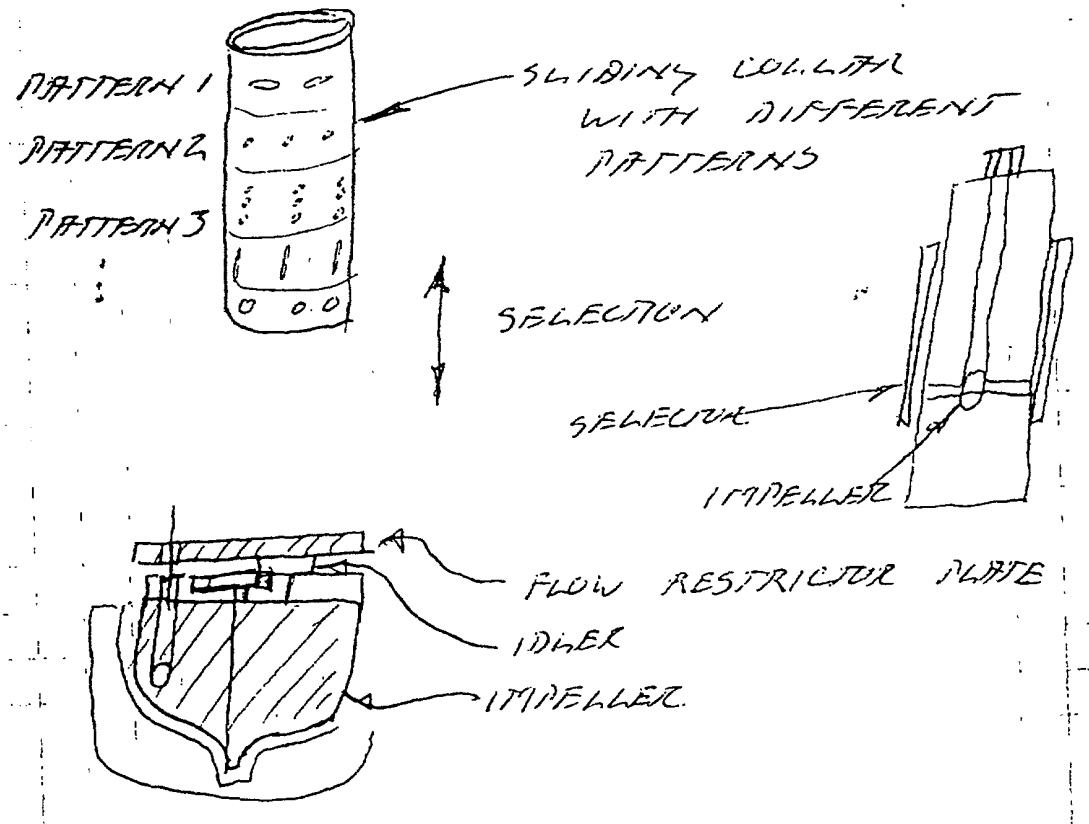
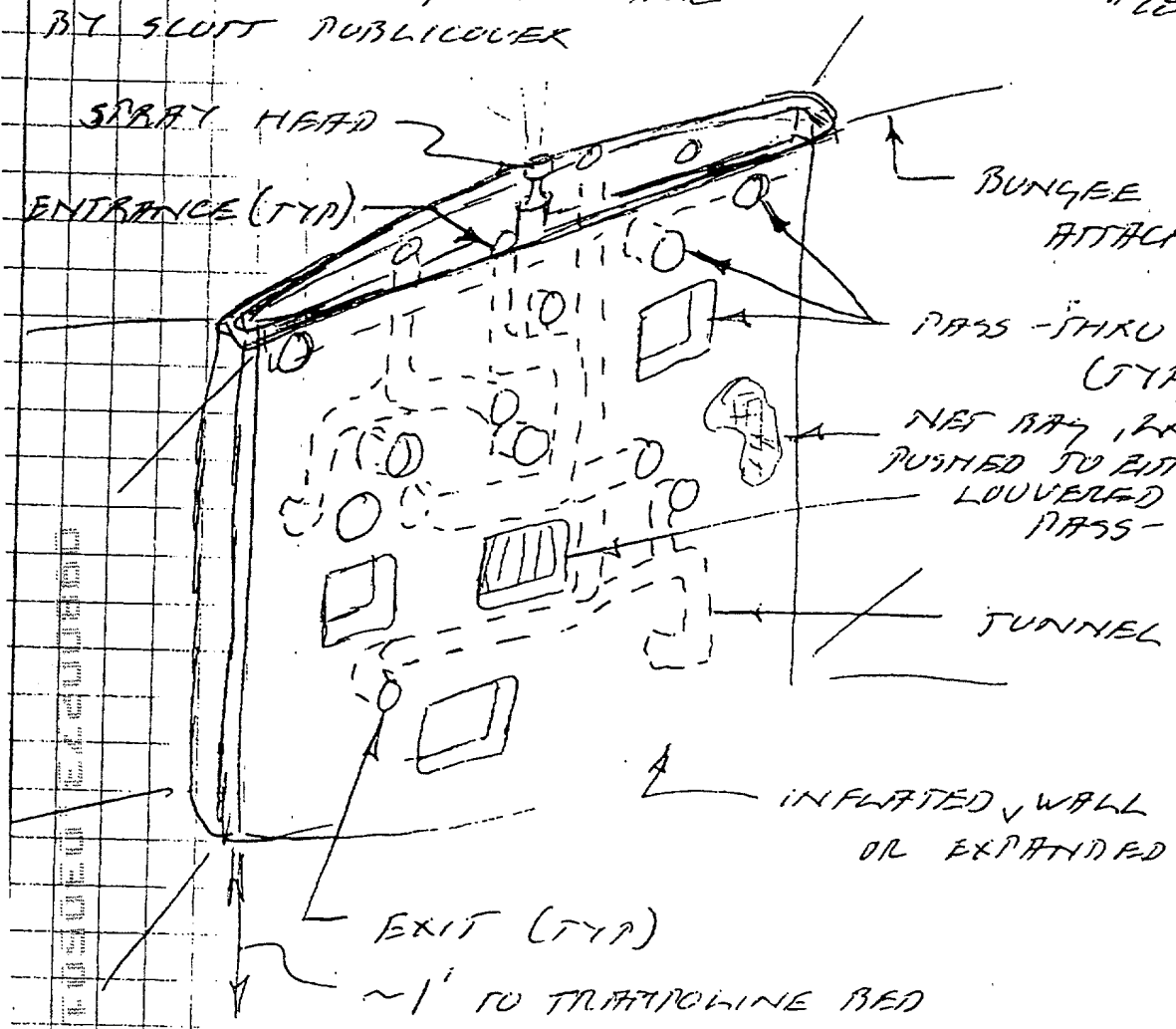


FLOW RESTRICTOR IS AN ECCENTRICALLY ROTATING PLATE DRIVEN THROUGH A GEARTRAIN TO PRESENT A CONSTANTLY CHANGING FLOW OPENING, INCREASING OR DECREASING THE STRENGTH OF THE WATER JET. AT THE SAME TIME, THE IMPELLER (WHICH DRIVES THE FLOW RESTRICTOR PLATE GEARTRAIN) RE-DIRECTS THE FLOW DIRECTION THROUGH THE SELECTED SPRAY PATTERN JET.

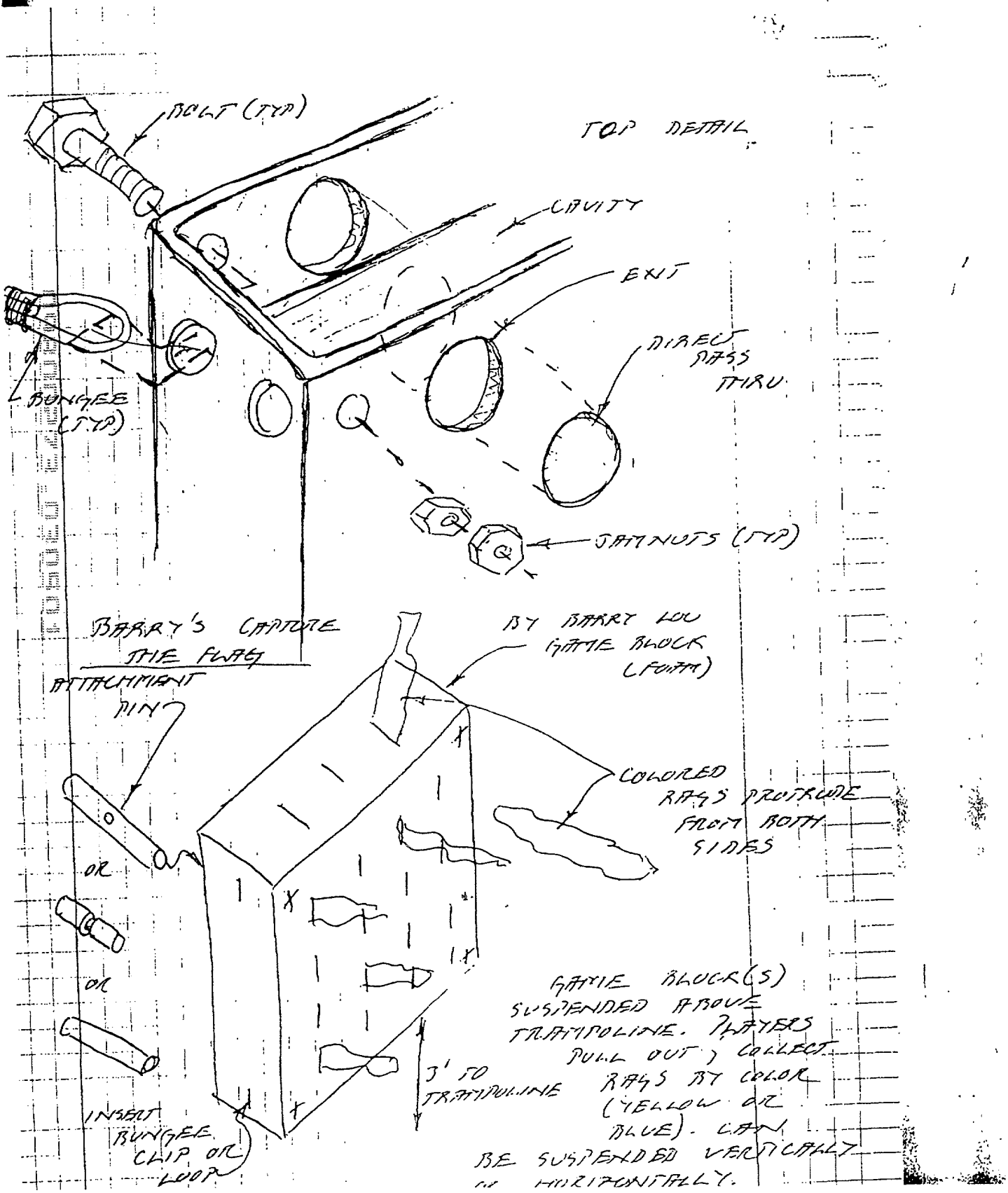
SCOTT'S GATTE WALL 6/4/98

BY SCOTT PUBLICOVER



INFLATED STRUCTURE, SUSPENDED BY BUNGEE CORDS, WITH INTERNAL TUNNELS & PASS-THROUGHS. WATER SPRAY HEAD ON TOP SPRAYS PLAYERS, ALLOWS WATER TO FLOW THROUGH TUNNELS, RANDOMLY CHANGING PATH OF BALLS FALLING THRU TUNNELS.

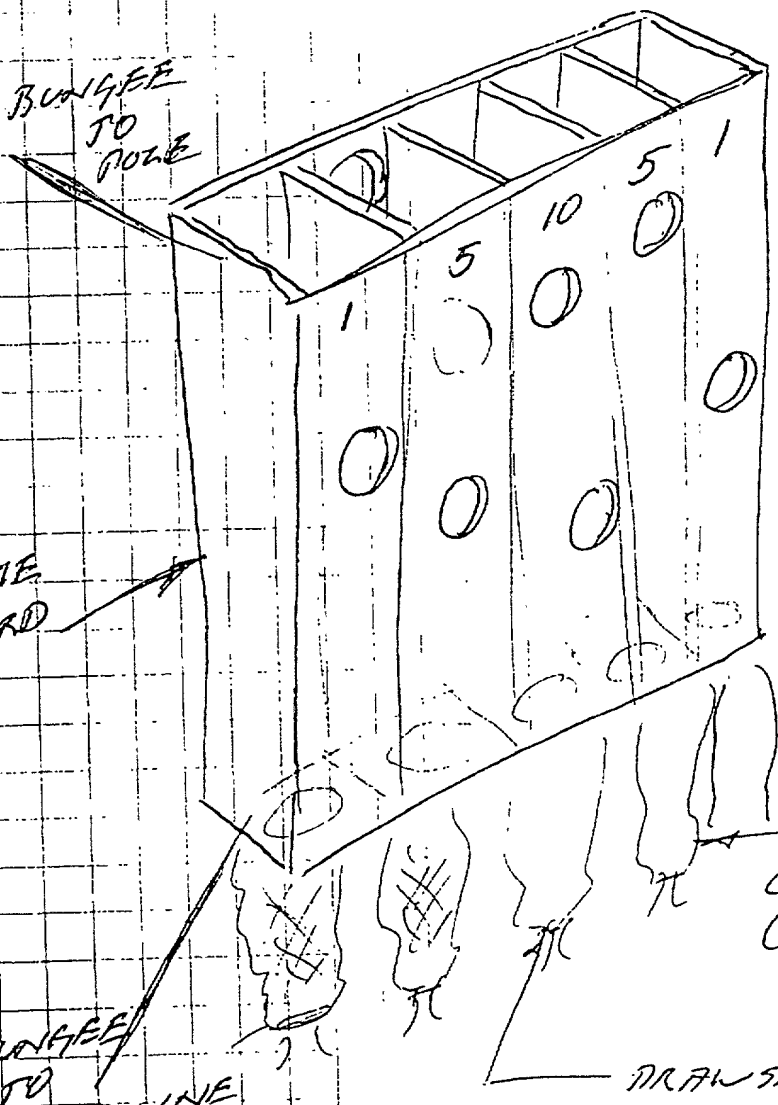
BALLS CAN BE PASSED THRU FROM SIDE TO SIDE, OR FALL FROM TOP CAVITY THRU TUNNELS. BALLS CAN END UP ON EITHER SIDE OF WALL

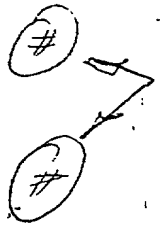

BOLT (TYP)
TOP DETAIL
CAVITY
EXIT
DIRECT PASS THRU
BUNGEE (TYP)
JAMNUTS (TYP)
BARRY'S CAPTURE THE FLAG
ATTACHMENT PIN
BY BARRY LOU
GAME BLOCK (FOAM)
COLORED RAGS PROTRUDE FROM BOTH SIDES
OR
OR
3' TO TRAMPOLINE
INSERT BUNGEE CLIP OR LOOP
GAME BLOCK(S) SUSPENDED ABOVE TRAMPOLINE. PLAYERS PULL OUT, COLLECT RAGS BY COLOR (YELLOW OR BLUE). CAN BE SUSPENDED VERTICALLY OR HORIZONTALLY.

6/4/98

JUMPCOURT PINBALL

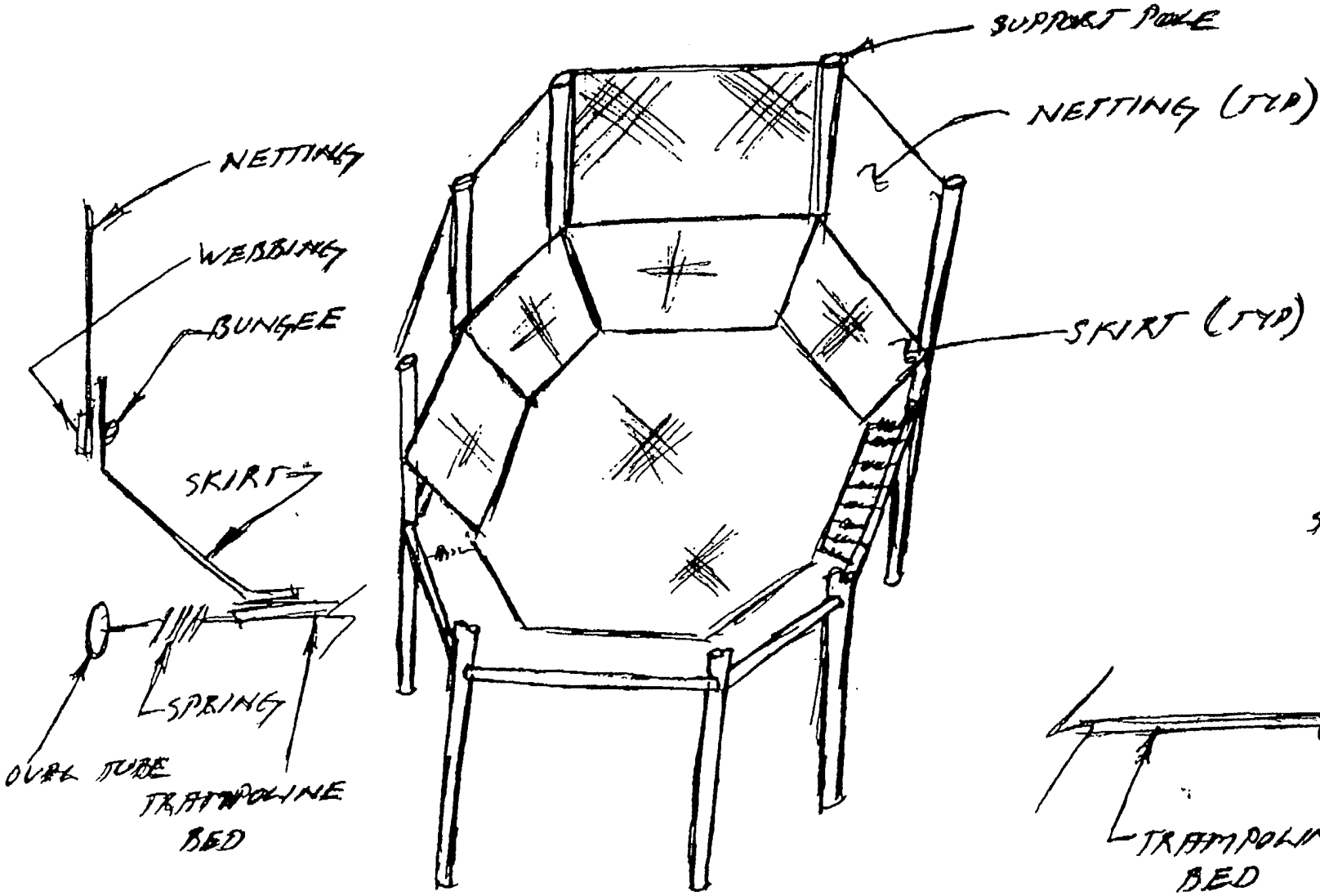
SCOTT PUBLICOVER
WITH BARRY LOU

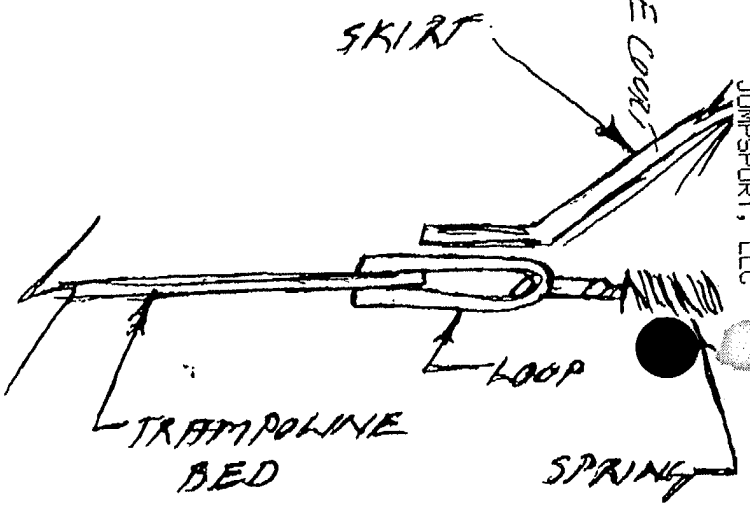




PLAYERS PLAY AGAINST THE CLOCK TO BE FIRST TO PUT ALL THEIR BALLS INTO GAME ~~HIGHEST POINT~~ BOARD AND/OR ACCUMULATE HIGHEST POINTS

GAME BOARD IS ATTACHED TO TRAMPOLINE BED ; MOVES IN RESPONSE TO JUMPERS, CAUSING FALLING BALLS TO JUMP ; FALL OUT OF GAME BOARD



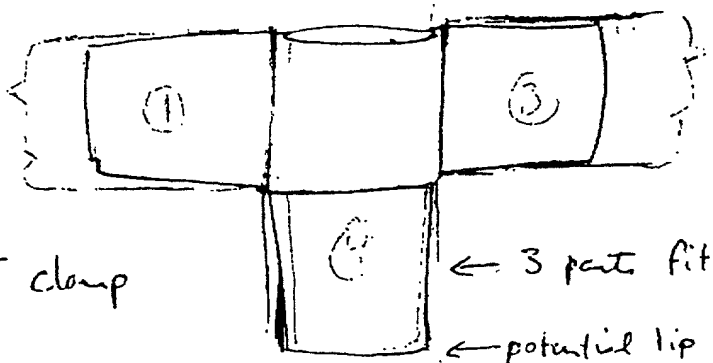


SKIRTED TRAMPOLINE CORD

6/4/98 Blue

"Clam Shell -T" Version #3 Weldless / toolless.

Side view



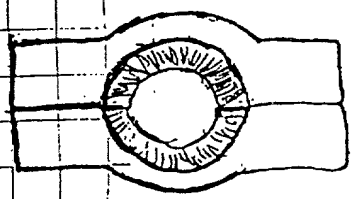
← 3 parts fit tightly together

← potential lip or closed end

Tubes 1, 2, + 3 fit over the 2 pieces of the cross clamp. Pipe (4) slides down into the T clamp and tube 2.

The upper portion of the former cross clamp is no longer needed as the strength comes from the joining of all parts and the overlap of 3 parts in the leg. Tube four may rest on a lip in the leg of the portion of the T clamp.

View from top



with this clam shell T, no tube would need swaging